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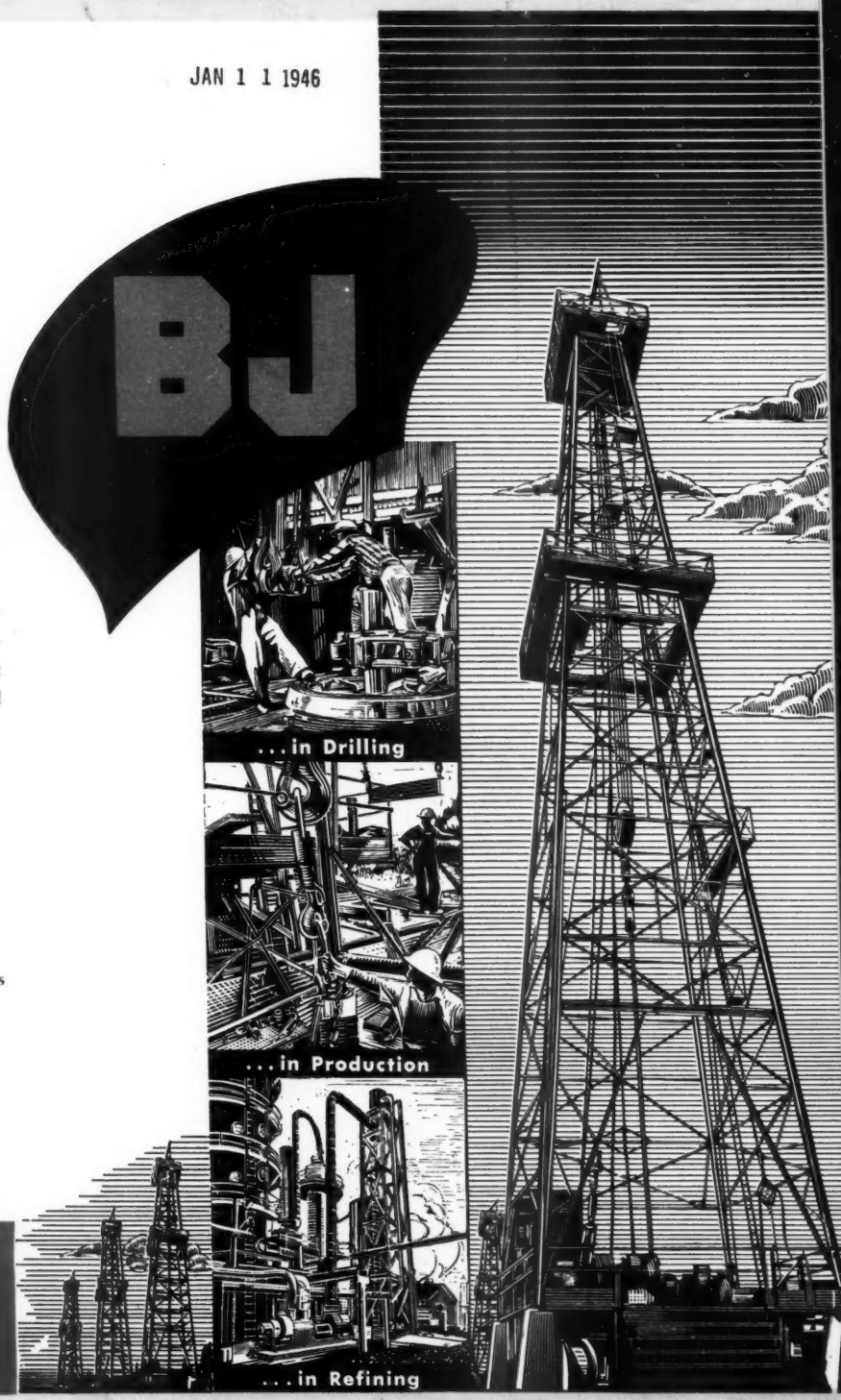

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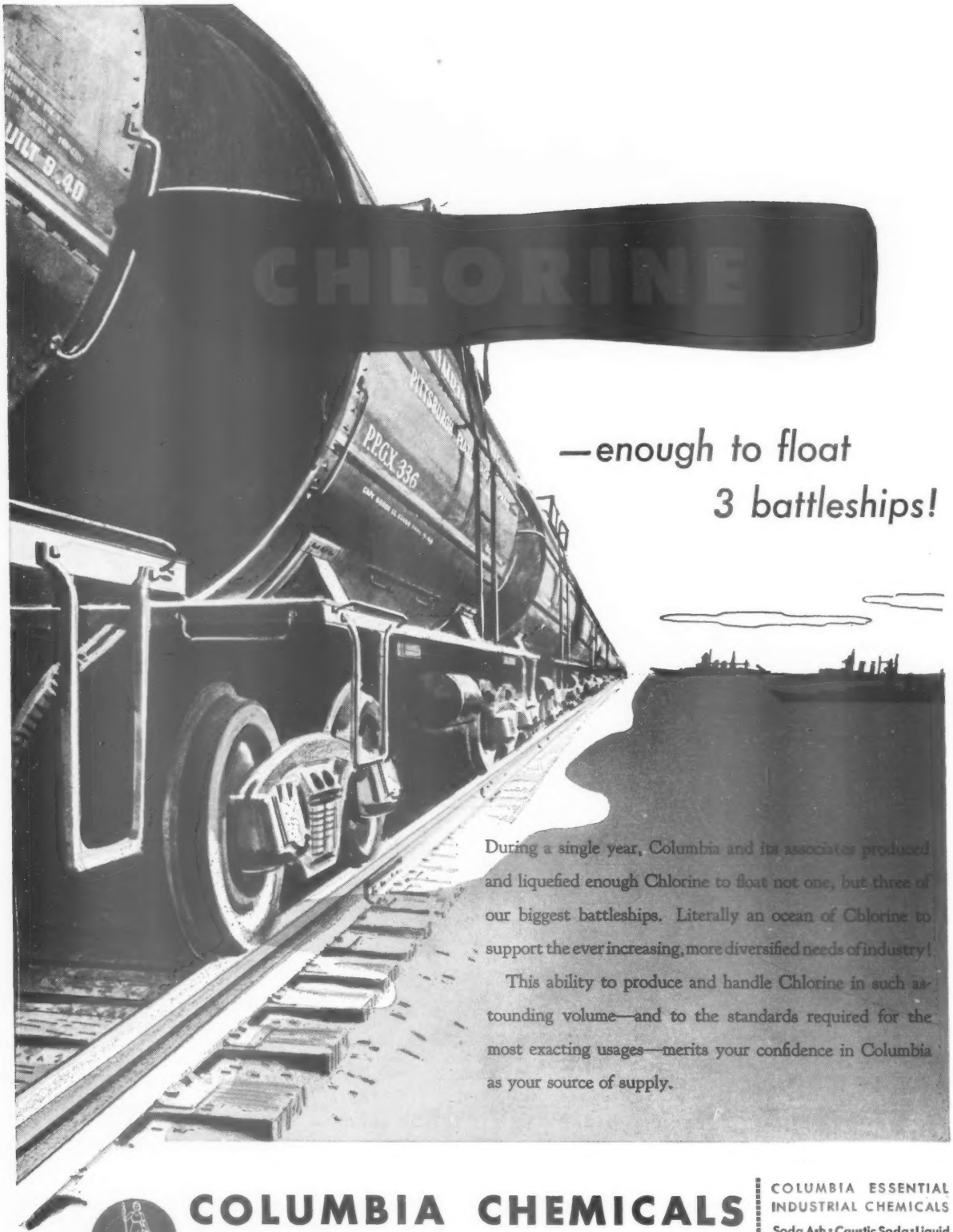

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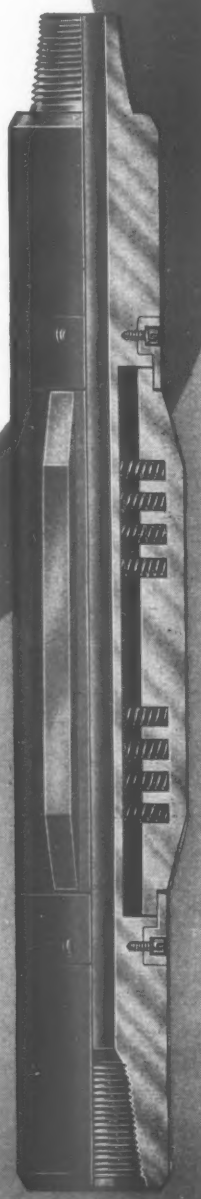

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The Big-Inch Problem

SOMETHING will have to be done with the big-inch pipe lines. Those who hoped that these vital transportation arteries of the war would continue in their inactive status indefinitely to await another possible emergency are indulging in wishful thinking.

These 24 and 20-inch lines connect to the main sources of supply and demand in this country and they will be live issues at Washington until they are absorbed in private operations or are removed and the equipment made part of other systems. The politically minded, unfamiliar with the operating differences of war and peace, look upon the lines as the solution for some of the real or imagined economic problems ahead. Furthermore, so long as they are owned by a federal agency, the two systems will be an invitation for extension of government controls.

The recent report to the Reconstruction Finance Corp. by a widely known engineering firm gives the petroleum and natural-gas industries and the entire country the information from which a constructive solution and the problem of "what to do with the big-inch lines" can be determined.

The weakness of the big war lines lies in their location. They afford the cheapest pipe-line transportation per unit of capacity the industry has ever known between the main termini. But they are not competitive with tankers in Gulf Coast-East Coast shipments largely because water transportation has flexibility to make smaller deliveries at many points.

The report to RFC suggests the possible conversion of the two lines from petroleum to natural gas. This would enable the taxpayers to recover a substantial part of the original investment in the lines, needed outlets for gas supplies would be provided, and tens of thousands of new customers would enjoy the many advantages of a superior fuel.

It is certain that such a program would have opposition at both ends of the line. Some officials of gas-producing states continue their shortsighted policy of opposing additional exportation of gas, an abortive conservation policy which promotes waste, works a hardship on operators, and retards rather than fosters industrial development of the Southwest.

At the consuming end of the lines is the opposition of competitive fuels, the railroads, and associated activities. In this connection much is said about the end uses of natural gas, the objective being to prohibit or control future industrial consumption, the principal outlet. As a conservation policy this attitude is as unsound as the attempts to restrict exports.

The inference from this and other features of the latest study of the big-inch lines is that they are more than an industrial operating problem. They have become an important segment of public policy and must be treated as such.

Venezuela Imposes Excess-Profit Tax in Surprise Decree

by Marian C. Cody

CARACAS (By Cablegram).—An excess-profit tax decreed here last week by the Venezuelan revolutionary government is expected to collect 25 to 30 million bolivares ($7,500,000-$10,000,000) from the United States and British oil companies.

The new tax, which the revolutionary government explained is for the purpose of improving standards of living, was a surprise to the oil companies. The decree states that the government intends to provide less-expensive food, adequate housing, and to organize a system for the promotion and encouragement of agriculture and industry.

The Venezuelan Government will immediately create a production-development institute with sufficient capital to accomplish the ultimate aims in improvement of the standards of living. The government intends, according to the decree, to start mass construction of houses for workmen in areas where they are most needed, to establish a mortgage bank, and create a national merchant marine.

In order to realize the government's objectives, officials declared, it is necessary to establish a working capital in excess of 100,000,000 bolivares.

Official Statement

Official government explanation for the unexpected move has been given in a signed statement to The Oil and Gas Journal by Dr. Juan Pablo Perez Alfonzo, minister of fomento:

Dr. Juan Pablo Perez Alfonzo, minister of fomento in Venezuela

"The amount of money received from the oil industry in payment of the new excess profits tax will be substantially greater than that paid by any other industry or industries. However, this is directly governed by the fact that the profits obtained by the oil companies were far greater than those profits received by other companies. There is no attempt whatsoever to discriminate against the oil industry nor shall we discriminate between Venezuelan and foreign capital. We need foreign capital in this country just as we need technical personnel that is supplied by the foreign investors.

"It is the duty of the ministry of fomento to protect industry, both native and foreign, and to further those measures that will be in the interest of industry, always keeping in mind the government's obligation to the Venezuelan people. No measures would have been taken that would not have been easily acceptable to the industry.

"Forty industries will be affected by the newly decreed tax. It is estimated that of this number 8 oil companies will be subject to the tax. The remaining 32 companies will be Venezuelan capital.

"Creole Petroleum Corp., the Royal Dutch Shell group, Mene Grande Oil Co., Pantepec Oil Co. of Venezuela, and Compania Consolidada de Petroleo will be among those companies subject to the tax. We believe that Socony-Vacuum Oil Co., Inc., will not be in this group nor many other of the operating companies here. It is estimated that of the total amount of money received from the tax which will be over 100,000,000 bolivares (approximately $30,000,000), 90 per cent of the tax receipt will come from the oil industry.

"We believe that it is justifiable to tax large excess profits to cover the numerous requirements of the country which must be urgently met. As I have often stated, we shall respect the oil law of course and shall make no changes whatsoever in the agreements made between the oil companies and our government.

Object of Measure

"The money obtained from the special tax will be used in such a way as to prevent continuation of the inflationary tendency of prices that we have been fighting. The money will be used to purchase necessary materials from markets outside of Venezuela that will be necessary to further production and development in this country. The primary object of the measure is to bring relief to the masses which have been neglected by previous administrations and who constitute by far the largest percentage of the population of this country. They have been deprived of the primary necessities of life. Through this measure their standard of living will be raised to a humanitarian level and they will constitute a potential purchasing power to absorb industrial goods which we expect to purchase from the States. At this time we are endeavoring to purchase a large number of units of vehicles such as tractors, trucks, agricultural machinery, wire fencing, etc.

"We do not consider this law retroactive. To the layman it would appear to be so. However, all taxes are calculated at the end of the year, after the profits have been made. Every industry keeps some reserve and some of these reserves are quite large. A tax taken from the excess profits of any particular company does not seriously affect the company.

"The excess profits tax is to be paid at the same time as the income tax which, as is well known, is much lower than in the United States and most of the other Latin-American countries. Income tax payments will be made in the same way as last year."

Here's How New Tax Is Applied

Here is the way the new Venezuelan excess-profit tax will be applied. The excess tax shall be paid for 1945 only on total net income without deduction by taxpayer for those amounts paid as normal income tax. Companies whose total net income calculated in accordance with terms of the income-tax law exceeds 800,000 bolivares will pay in addition to normal income tax following extraordinary tax:

Income range (bolivares)—	Tax (%)
800,000-1,000,000	6
1,000,000-1,400,000	10
1,400,000-2,000,000	15
2,000,000 and above	20

(Conversion: 1 Bolivar equals approximately 30 cents.)

Panel Begins Study of Causes Of Refinery-Wage Disputes

by Henry D. Ralph

WASHINGTON. — The refinery-wage fact-finding panel began this week to examine the causes of the dispute which led to Navy seizure of some 50 refineries after both company and union representatives reported that only two additional plants had been released to private operation as a result of settlements reached during the holiday recess of the panel's hearings.

Telegrams from 14 of the oil companies with plants still under Navy control reported that negotiations were under way with local unions and that early settlements were in prospect, and they asked that the panel take a further recess to permit settlement by collective bargaining. Spokesmen for the Oil Workers International Union, while confirming that negotiations are in progress at virtually all the seized plants, declared that the companies have interjected extraneous issues which are delaying settlement and that no purpose would be served by further delay. Settlements have been reached with Pure Oil Co. regarding its Cabin Creek refinery and Texas Co. at its West Tulsa refinery, but other plants of both companies are still under Navy control.

The only company representatives making a formal appearance when the hearings resumed January 7 were Lowe for Socony-Vacuum and Harry Rosenbloom, attorney for Atlantic Refining Co. Both rested their cases on briefs previously filed which took the position that since the company was not pleading inability to pay the panel should not consider its earnings, profits, or costs. Each filed formal objections to consideration of sections of the union brief dealing with such matters.

In a telegram to Dr. Frank P. Graham, chairman of the panel, B. Brewster Jennings, president of Socony-Vacuum, objected to government consideration of ability to pay in studying wage questions.

Jennings' telegram said his company was "unwilling . . . to encourage a trend in the direction of a regimented economy. Any tie between wages and earnings," Jennings asserted, "would lead inevitably and rapidly to a rigid government control of industry. Such control would of necessity be almost identical with the so-called Fascist economies which were developed in Germany and Italy during the 1930's."

O. A. Knight, president of O.W.I.U., explained that the chief extraneous issues were company demands for a permanent 40-hour week and for company security, although in many cases there are local issues such as old grievances and miscellaneous matters to be cleared up before contracts can be signed. He admitted that the chief issue before the wage panel is the rate of pay when hours are reduced from 48 to 40 per week. Demands for company security vary in their terms, he said, including fines and cancellation of contract for work stoppages, and these would impose obligations on the union which it could not fulfill unless it has a closed-shop contract.

Company States Position

Richard H. Lowe, attorney for Socony-Vacuum Oil Co., Inc., disputed the statement that his company wants a permanent 40-hour week, explaining that it is asking only a 40-hour week without overtime for the 1-year term of the proposed new contract, and is ready to grant an 18 per cent increase in hourly rates plus changes in shift differentials and some reclassification of workers.

Knight countered that since about 1934 refinery contracts have been based on a 36-hour week but that during the war the unions agreed to supplements permitting straight pay up to 40 hours, and he wants new contracts worded so that the refining industry can return to 36-hour week easily whenever manpower conditions warrant. Although the union is still officially asking for a 30 per cent increase, Knight indicated that it would settle for 18 per cent on reduction of hours from 48 to 40 but wanted the contracts to specify a further increase of 10 per cent in the hourly rate whenever hours drop to 36.

The union also confirmed its presentation to reading its brief previously filed by Lindsey P. Walden, general counsel. This dealt extensively with such subjects as the need of oil workers for more pay to maintain decent standards of living, the desirability of a general economic policy of high wages and low prices, and the earnings, profits, tax, reserve, and general financial condition of the oil industry as shown by corporation statements and reports of various government agencies.

The panel announced its intention of obtaining data on living costs, wage rates, and the condition of the oil industry from other government agencies, and expressed the hope that other companies involved in the dispute, some of which had representatives present as unofficial observers, would make appearances later to state their individual positions.

When the hearing opened Tuesday, Knight said he wanted to correct the impression that the union has reduced its demands to an increase of 18 per cent. He explained that while it has settled with some companies for that figure and is negotiating with others on a similar basis, the union stands on its original request for an increase of 31 per cent in the hourly rate or 36 cents per hour for all refinery workers as being necessary to maintain workers' take-home pay and as being within what the companies can well afford to pay without price relief. He asked that the panel make a finding that a 31 per cent increase is possible, permissible, and justified.

Panel member Otto Beyer pointed out that before the war the unions demanded punitive overtime rates as a means of spreading employment and asked if the union position now is that overtime rates should be incorporated in permanent basic rates. Knight dodged this by saying that living costs have gone up so that in order to maintain his prewar living standard a worker must get as much for 40 hours as he got during the war for 52 straight-time hours. Beyer then asked if it was only a coincidence that the "52 for 40" formula was the same as the increased cost of living.

Knight replied that statistically refinery workers needed a 50 per cent increase to maintain living standards but the union was asking only 31 as a reasonable adjustment and within the

Statistical Data Now Concentrated

Statistical data on production, drilling, and refinery operations along with market summaries and the trend of petroleum stocks have been concentrated for the convenience of readers. These data appear on pages 118 and 119 in this issue and will appear regularly immediately preceding the Exploration and Drilling Section in subsequent Journals.

limits set by the Office of Economic Stabilization.

Panel chairman Frank P. Graham then read this OES directive which stated that living costs have risen 33 per cent during the war, and Knight asked if the panel is limited to a wage increase equal to the rise in living costs, declaring the OES directive pertinent if the union were asking for the maximum permitted instead of only for maintenance of take-home pay. Graham replied that the OES directive is a limiting factor only so far as increased living cost is a factor but it does not apply to voluntary pay increases reached by collective bargaining. Graham added that he considered the panel proceedings as an extension of the collective-bargaining process which broke down before Navy seizure of the plants and that the panel would conduct itself in the role of an arbiter in bargaining.

The panel then called A. F. Hinrichs of the Bureau of Labor Statistics to report on studies made at the panel's request of wages, hours, employment, job classification, and other conditions in the refining industry as a whole and in the plants under consideration.

C.R.C. Elects Day Director Succeeding R. A. Halloran

NEW YORK.—David E. Day, vice president of Richfield Oil Corp., was elected a director of the Coordinating Research Council at the annual meeting of that body here January 3. Day succeeds Ralph A. Halloran, president of California Research Corp., subsidiary of Standard Oil Co. of California, who declined reelection. Other directors reelected include: J. M. Crawford, William Littlewood, Arthur Nutt, J. C. Veeder, C. E. Davis, T. G. Delbridge, K. G. MacKenzie, and G. G. Oberfell.

DAVID E. DAY

Price Increases for Crude In Six States Approved

WASHINGTON.—Increases in producers' price ceilings for crude oil ranging from 4 to 35 cents a barrel in 14 pools of six states have been authorized by Office of Price Administration, effective December 1, 1945. The increases were granted under the subsidy program designed to encourage production of stripper wells. The Government reimburses first purchasers, generally refiners, with the exact amount of the increase.

The 14 pools added to the list and the amount of the increase for each in cents per barrel:

Texas — Government Wells South, 20; Hotard-Glasscock, 4; Ross (Caddo), 20; Sand Flat (Odessa), 20; Wheat, 20.

Oklahoma—Arno West, 20; Lyons-Quinn, 10 (through raising previous increase of 25 cents to 35 cents); Slick, 5 (through raising previous increase of 20 cents to 25 cents); Wilcox, 5 (through raising previous increase of 20 cents to 25 cents).

Kentucky — Livermore (McClosky) and North Livermore, each 35 (through removing them as exceptions from the list of Kentucky pools entitled to an increase of 35 cents).

Colorado—Welling, 5.

Kansas—Burton NE, 6.

New Mexico—Copper-Jal, 6.

The Pettiquah pool, Oklahoma, previously granted an increase of 35 cents, is declared no longer entitled to this increase, as it is shown to be a gas pool.

Texas Oil Men Preparing to Fight Ratification of Pact

HOUSTON.—Texas oil men, public officials, educators, and others will appear as witnesses before the foreign relations committee of the Senate when hearings are opened this month on the Anglo-American petroleum treaty. They will present testimony under the sponsorship of the recently formed Texas state-wide committee of oil operators opposed to ratification of the pact.

D. W. Hovey, Houston independent operator and chairman of the committee, challenged the contention of treaty advocates that "opposition in the oil industry is insignificant or nonexistent."

"We will refute that contention," said Hovey, "by producing witnesses representing a substantial segment of the oil industry, including both independents and representatives of major companies. We also intend to present as witnesses state officials concerned with oil regulation and public education who will reiterate before the committee their strong opposition to the treaty. It is significant that these Texas officials are directly concerned with protecting the public interest in connection with the oil industry and the income it provides for public education, and they solidly oppose ratification of the treaty.

"We will present testimony which will show that the present treaty, like the one withdrawn under fire from the Senate last January, is a step toward placing the American oil industry under control of an international body and opening the American market to huge quantities of foreign oil from the Middle East, with tremendous economic losses to American oil producers, refiners, land owners, and the millions of persons in this country dependent directly or indirectly upon production of petroleum for a livelihood."

OPA's Attitude on Ceilings Indefensible, Says Hallanan

PITTSBURGH. — Office of Price Administration's assumption of a relationship between ceiling prices for crude and ceiling prices for fuel oil is characterized by Walter S. Hallanan, president of Plymouth Oil Co., as indicative of "the unintelligent and indefensible attitude of OPA with respect to the necessity of weighing the overwhelming factors that necessitate an increase in the crude-oil price ceiling."

Hallanan's criticism was contained in a telegram to oil producers and members of Congress following publication of a statement by an OPA official that there would be no increase in the price of crude because OPA recently raised the price of fuel oil and that this action provided the problem.

Asking what possible connection there could be between the price of fuel oil and relief to the crude-oil producer, Hallanan, who was chairman of the production committee of Petroleum Industry War Council, declared that if the oil producer is expected to do his part to maintain essential reserves it is imperative that he be released from the restrictions of war emergency control and set free from the hardships of bureaucratic price control.

"I think it is high time for the crude-oil producers to realize they are being crucified on a cross of ignorance and prejudice and we should mobilize our forces in Congress to try to secure some relief from OPA discrimination," he said.

Chilean Test Well Points to End of Petroleum Imports

SANTIAGO. — Shows reported at the test well being drilled at Spring Hill, north of Tierra del Fuego, afford ground for belief that Chile is about to open petroleum resources which will more than meet this country's requirements. Up to the present time all of Chile's oil needs have been met by imports, whose value has totaled $14,000,000 annually. If more exhaustive tests of the Spring Hill well confirm early findings, all this will be saved.

Reports from the well indicate daily production of about 2,000 cu. m. (6.29 bbl. per cubic meter) of oil. "Hopes seem to be justified that Chile's production will be double her actual requirements," according to the office of the minister of economy and commerce.

The well is reported to be bottomed at about 7,400 ft.

THIS WEEK

FOREIGN—Venezuelan Government imposes excess-profit tax, ranging from 6 to 20 per cent on oil companies. . . . Levy applied by decree is intended to raise $7,500,000 to $10,000,000. . . . Government intends to improve quality and reduce cost of food, build workers' houses, develop agriculture and industry with revenue. . . . Oil companies surprised at move which applies to net income for 1945 before deduction of normal taxes. . . . ¶Chile has first oil production. . . . Well in extreme south of country, near Straits of Magellan, hits 10 ft. of oil sand at 7,428 ft. . . . Drilled by George Livermore of Lubbock on geology by Glen M. Ruby. . . . Operating control rests in national agency—Corporation de Fomento de la Produccion. . . .

LABOR—Oil industry wage fact-finding panel hits snag in resuming hearings this week. . . . Fourteen struck refining companies insist on resuming direct negotiations with C.I.O. union. . . . Only two companies show up for resumed hearings and one makes participation contingent on "its own terms." . . . ¶The Texas Co. refinery at Tulsa turned back to private management by Navy after 18 per cent wage advance satisfies local C.I.O. union demands. . . .

TRANSPORTATION—Surplus Property Administration recommends sale, lease or government operation of Big Inch WEP lines. . . . Engineering firm points out impracticality of private operation—unless eastern refining companies make maximum-load potentialities. . . . ¶British and French initiate negotiations for 100 surplus American tankers. . . . More United States tankers retired temporarily to surplus-ship berths. . . . Ultimate disposition in doubt, but vessels probably will go to friendly foreign interests. . . .

PRODUCTION—Texas' output increased more than 80,000 bbl. per day, accounting for all of national increment. . . . Kansas in major slump of approximately 35,000 bbl. . . . California up 5,000 bbl., eastern down 3,000. . . .

DRILLING—Completed wells decline 75 in first week of 1946. . . . Part of indicated reduction chargeable to irregular check meetings, holidays and inclement weather. . . . ¶Observers watch drilling trend avidly for signs of influence from revised tax situation. . . .

LEGISLATIVE—Federal Power Commission may yield some regulatory authority to Interior Department, in reshuffle of federal agencies. . . . ¶California Legislature in special session to consider ownership of tidelands. . . . ¶Texas committee prepares opposition to Anglo-American oil agreement. . . . Senate committee on foreign affairs to open oil-treaty hearings January 27. . . .

RUBBER—Maintenance of synthetic-rubber plants in operating condition advocated before Society of Automotive Engineers. . . . Stockpile of natural rubber suggested. . . . Continued use of 200,000 tons annually of synthetic proposed, regardless of natural-rubber supply. . . . Plants capable of making 600,000 to 700,000 tons annually wanted in standby condition. . . .

Zero temperatures and heavy snows failed to halt work on the new 6-in. oil pipe line laid for The Texas Co. from its Wilson Creek field high in the mountains of northwestern Colorado. The line, approximately 10 miles long with a drop in that distance of 1,100 ft., parallels and loops an old 4-in. line extending to the Iles field. At times drifting snow filled the ditch before the pipe could be lowered and had to be shoveled out by hand labor to permit work to proceed. Picture shows lowering of pipe into the ditch following coating and wrapping

Engineers Analyze Possible Postwar Uses of WEP Lines

by Henry D. Ralph

WASHINGTON. — Possible postwar uses of the two big-inch pipe lines, with accompanying operating costs, have just been made available in a detailed report made to the Reconstruction Finance Corp. by the consulting firm of Ford, Bacon & Davies, Inc. The first story on this report appeared in the January 5 issue of the Journal.

In the second and last story of this series, the engineers summarize the necessary economic factors which must be considered in the operation of the lines — whether for crude, products or natural gas. Moreover, it is pointed out that government participation in the possible postwar operation of the lines is practically a "must" in that Uncle Sam would have to stand much of the risk until sufficient markets were established for the profitable operation of the lines.

The engineers' conclusions which have been reached from their studies and investigations follow:

"1. The big-inch line operating at or near capacity can deliver crude oil from East and Central Texas to its Eastern Seaboard terminals at least as cheaply as can be done by any other method of transportation, but the little big-inch products line, on account of its smaller capacity, cannot compete with tanker transportation of products from the Gulf Coast to New York.

"2. There is not enough possible business along the route of the lines to warrant the continued use of the big-inch system as a crude-oil carrier postwar unless the Eastern Seaboard refiners will continue to use it in substantial volume. This use is doubted because these refiners undoubtedly will wish to return to the use of tankers, primarily on account of greater flexibility of tanker operation.

"3. There is no economic use for the little big-inch products system indicated postwar except as it may be converted to natural gas in whole or in part.

"4. The main pipe lines and main-line branches of the system are readily convertible to the transportation of natural gas. An ample supply of natural gas exists in Texas close to the lines. The area in which the lines terminate at the Eastern Seaboard holds the largest concentrated potential natural-gas market not now served, believed to exist in the United States.

"5. The average price at which natural gas can be laid down at or near the Eastern Seaboard through the two main-line systems acquired at estimated postwar cost of equivalent systems designed for natural gas is approximately 25.35 cents per 1,000 cu. ft. on the basis of 115,000,000,000 cu. ft. being sold annually at a load factor of 75 per cent. If this price can be obtained, the two main pipe lines and their rights-of-way would have a value of not more than $82,428,500. This average price is somewhat higher than the engineers believe can be obtained, at least initially. At an average price of 20 cents per 1,000 cu. ft. which should be initially obtainable the earnings will permit an investment of $40,450,000 in the two main-line systems including the rights-of-way on which they are built, but not including any feeder and distribution facilities, pumping stations, tankage, electric transmission lines, automobiles, trucks and tools and furniture and fixtures. Any money which could be obtained from the sale of these items would be in addition to these figures.

"6. It will probably be necessary, in order to effect a sale of the lines for natural-gas service, for the Government to take at least most of the risk which the engineers believe is inherent in their ownership and operation in natural-gas service, until sufficient sales can be obtained to make their operation profitable. It may take 5 years or more to work out such a situation because there does not seem to be any desire on the part of any established gas company to acquire the lines for their full length.

"It is possible that the part of the little big-inch products system, or even of the 24-in. crude system west of Cincinnati might be sold to interests whom it is understood are requesting a certificate of convenience

TABLE 2—SUMMARY ESTIMATED COSTS OF TRANSPORTATION OF PRODUCTS BY 20-IN. SYSTEM BEAUMONT TO NEW YORK

(Including Fixed Charges at 11 Per Cent on Purchasers' Investment But Exclusive of Transportation, Ad Valorem and Income Taxes)
(Cents per barrel)

		Average daily throughput (barrels) and load factor			
		190,000 100%	160,000 83.3%	125,000 66.6%	95,000 50%
Products—by 20-in. line Beaumont to New York (1,476 miles)—					
Purchasers' investment:					
$60,000,000		19.6	22.8	26.4	33.7
50,000,000		18.1	20.9	24.1	30.5
40,000,000		16.5	19.0	21.8	27.4
30,000,000		14.9	17.1	19.4	24.2
20,000,000		13.3	15.2	17.1	21.1
10,000,000		11.8	13.3	14.7	17.9
Products by tanker—Port Arthur to New York—					
(a) Including return and depreciation—Tanker valuation	$1,500,000	14.9	14.9	14.9	14.9
Tanker valuation	1,000,000	13.1	13.1	13.1	13.1
(b) Out-of-pocket operating cost		9.6	9.6	9.6	9.6

TABLE 1—SUMMARY ESTIMATED COSTS OF TRANSPORTATION CRUDE OIL

24-in. System—Longview to New York (Including Fixed Charges at 11 Per cent on Purchasers' Investment but Exclusive of Transportation, Ad Valorem and Income Taxes
(Cents per barrel)

		Average daily throughput (barrels) and load factor			
		300,000 100%	250,000 83.3%	200,000 66.6%	150,000 50%
Crude oil—by 24-in. line Longview to New York (1,338 miles)—					
Purchasers' investment:					
$60,000,000		13.4	15.3	17.6	21.7
50,000,000		12.4	14.1	16.1	19.7
40,000,000		11.4	12.9	14.6	17.7
30,000,000		10.4	11.7	13.1	15.7
20,000,000		9.4	10.5	11.6	13.7
10,000,000		8.4	9.3	10.1	11.7
Crude oil—by tanker—Gulf ports to New York—					
(a) Including return and depreciation—tanker investment	$1,500,000	17.6	17.6	17.6	17.6
Tanker investment	1,000,000	15.5	15.5	15.5	15.5
(b) Out-of-pocket operating cost		11.4	11.4	11.4	11.4

Comparison of the range in possible costs by pipe line and tanker (Table 1) indicates the amount which a purchaser could pay for the system and the throughput it would require to keep total costs per barrel by pipe line below the costs by competitive tankers based on investments of $1,500,000 and $1,000,000 per tanker.

and necessity from the Federal Power Commission to construct an 18-in. pipe line between the Carthage gas field in northeastern Texas and a point near the city of Cincinnati. If this sale were made the remainder of the line east of Cincinnati would likely have only salvage value.

"7. The lines devoted to natural-gas service should return to the Government a greater percentage of their original cost than would be returnable under any other form of postwar use."

The study was made this past summer and fall, and the valuation is as of June 30, 1945. The valuation includes the pipe lines themselves, land owned and used by WEP, pumping stations, terminal facilities, storage, branch lines, office furniture and equipment, and supplies and spare equipment. It is based on labor and material prices current during June 1945, and on the assumption that materials are available and their delivery would not be affected by war conditions, that there would be an ample supply of reasonably efficient construction labor, that overtime work would not be required, and that no changes would be made in the plans during construction which would increase costs. Exclusive of rights-of-way, cash working capital, going concern value, and warehoused supplies, the engineers estimated that the present normal cost of reproduction new is $63,763,475 for the 24-in. crude line and $60,321,071 for the 20-in. products line. Deductions for depreciation since the lines were built gives a present valuation of $61,293,178 for the 24-in. and $56,934,760 for the 20-in.

The 20-in. was depreciated $1,000,000 because of the initial failure of some of the pipe which prevented operating the line to its engineered capacity of 750 psi. pressure and 235,000 bbl. per day delivery of gasoline. The engineers said this was an important factor in the usefulness of the line and it would require a substantial expenditure to put it in shape for capacity operation.

In the economic study the engineers declared that the crude line has operating costs between Texas and New York comparable to tanker costs when operated at capacity, but it loses much or all of this advantage when the volumes transported are reduced to any reasonable postwar expectancy unless the operator's investment in the pipe line was low relative to the normal reproduction cost of the system. The products line, on the other hand, has operating costs, even at full capacity, higher than the estimated cost of tanker transportation.

In these estimates the report assumed that a modern T-2 type tanker might range in commercial value postwar from $1,000,000 to $1,500,000, which is considerably below wartime construction costs.

Little possibility exists of operating the lines at capacity on a commercial basis, the engineers concluded, because the major companies would prefer the flexibility of tankers at comparable costs, while the independent refineries could not furnish sufficient volume. Difficulties of obtaining sufficient feed stocks were also considered to be enormous. It was assumed that the cost of moving crude from East Texas and Central Texas fields to the big-inch terminal at Longview would average about the same as pipe-line charges to Gulf Coast ports.

TABLE 3—SUMMARY, ESTIMATED COSTS OF TRANSPORTATION BY 24-IN. AND 20-IN. PIPE LINES, LONGVIEW AND BEAUMONT, TEX., TO NORRIS CITY
(Cents per barrel)

	Average daily throughput (barrels) and load factor			
	300,000 100%	250,000 83.3%	200,000 66.6%	150,000 50%
Crude oil—by 24-in. line, Longview to Norris City (530 miles)—				
Purchasers' investment:				
$24,000,000	5.4	6.2	6.9	8.5
20,000,000	5.0	5.7	6.3	7.7
16,000,000	4.6	5.2	5.7	6.9
12,000,000	4.2	4.7	5.1	6.1
8,000,000	3.8	4.3	4.5	5.3
4,000,000	3.4	3.8	3.9	4.5
	190,000 100%	160,000 83.3%	125,000 66.6%	95,000 50%
Products—by 20-in. line, Beaumont to Norris City (667 miles)—				
Purchasers' investment:				
$27,000,000	8.8	10.3	11.7	14.9
22,500,000	8.1	9.5	10.7	13.5
18,000,000	7.4	8.6	9.6	12.1
13,500,000	6.7	9.8	8.6	10.6
9,000,000	6.0	6.9	7.5	9.2
4,500,000	5.3	6.1	6.5	7.8

TABLE 4—SUMMARY, ESTIMATED COSTS OF TRANSPORTATION BY 24-IN. AND 20-IN. PIPE LINES, NEW YORK TO NORRIS CITY
(Cents per barrel)

	Average daily throughput (barrels) and load factor			
	300,000 100%	250,000 83.3%	200,000 66.6%	150,000 50%
Crude oil—by 24-in. line, New York to Norris City (808 miles)—				
Purchasers' investments:				
$36,000,000	8.0	9.1	10.7	13.2
30,000,000	7.4	8.4	9.8	12.0
24,000,000	6.8	7.7	8.9	10.8
18,000,000	6.2	7.0	8.0	9.6
12,000,000	5.6	6.2	7.1	8.4
6,000,000	5.0	5.5	6.2	7.2
	190,000 100%	160,000 83.3%	125,000 66.6%	95,000 50%
Products—by 20-in. line, New York to Norris City (808 miles)—				
Purchasers' Investments:				
$33,000,000	10.8	12.5	14.7	18.8
27,500,000	9.9	11.4	13.4	17.0
22,000,000	9.1	10.4	12.1	15.3
16,500,000	8.2	9.3	10.9	13.6
11,000,000	7.3	8.3	9.6	11.9
5,500,000	6.5	7.2	8.3	10.1

Comparison With Tanker Rates

On this basis the engineers compiled some tables to compare tanker costs with the big-inch costs operating at various capacities and assuming various purchase prices for the properties. Table 1 shows the computations on the crude.

Commenting on this, the report said:

"In comparing costs by pipe line and by tanker it should be taken into account that pipe-line transportation would be subject to a federal transportation tax of 4½ per cent on gross revenues and to ad valorem taxes in the states traversed to which tanker transportation is not subject. The effect of this would be to increase the pipe-line costs over the amounts shown in the table. It is also pointed out that a differential in favor of the pipe line shown for any particular conditions as to purchasers' investments and throughput in the pipe line, does not in itself indicate it could compete with or take business away from tankers under those conditions. The tanker, due to its flexibility in reaching numerous sources of crude supply and markets for products, has many operating advantages over the pipe-line system, tied, as it is, to a single source of supply (East and Central West Texas) and to a fixed location which would limit its delivery of crude oil to comparatively few markets.

"Inspection of Table 1 indicates, for example, that with a purchase price of $30,000,000 for the line, and assuming it could be continuously operated at improbably high load fac-

(Continued on page 70)

Liquefied Petroleum Gas Sales in 1945

Up 21.4 Per Cent Over 1944

Production and loading facilities at a Texas liquefied-petroleum-gas plant

by G. G. Oberfell and R. W. Thomas

1. Sales Estimated to Exceed 1 Billion Gallons

THE total liquefied-petroleum-gas sales in 1945 excluding those for the production of automotive and aviation gasoline, and synthetic-rubber components are estimated to be 1,100,000,000 gal., an increase of 21.4 per cent over 1944, notwithstanding that for several years the liquefied-petroleum-gas industry has been operating under restrictions applied both to supply and to utilization facilities. Although practically all government restrictions on liquefied petroleum gas have been removed, the use of this material has not increased as much as would have been expected after the termination of the war, because of shortages of manpower and materials for fabricating gas-consumers appliances, storage, utilization, and transportation equipment.

2. Domestic Use of L.P.G.

The largest single use of liquefied

TABLE 1—MARKETED PRODUCTION OF L.P.G.

Year—	Total Sales Gallons	Total Sales % Inc.	Distribution — 1,000 Gal. Annually — Domestic	% Inc.	Ind. and Misc.	% Inc.	Gas Mfg.	% Inc.	Chem.(b) Mfg.	% Inc.
1922	223	....								
1923	277	24.4								
1924	376	36.0	Sale of L.P.G. confined primarily to bottled-gas business prior to 1928							
1925	404	7.2								
1926	465	15.2								
1927	1,091	134.6								
1928	4,523	314.6	2,600	....	400	....	1,500	....	....	....
1929	9,931	119.6	5,900	126.9	1,500	275.0	2,500	66.7	....	....
1930	18,017	81.4	11,800	100.0	2,200	46.7	4,000	60.0	....	....
1931	28,770	59.7	15,295	29.6	7,172	226.0	6,303	57.6	....	....
1932	34,115	18.6	16,244	6.2	8,167	13.9	9,703	53.9	....	....
1933	38,931	14.1	16,626	2.3	13,987	71.3	8,318	—14.3	....	....
1934	56,427	44.9	17,681	6.3	32,448	132.0	6,298	—24.3	....	....
1935	76,855	36.2	21,380	20.9	47,894	47.6	7,581	20.4	....	....
1936	106,652	38.8	30,014	40.4	67,267	40.4	9,371	23.6	....	....
1937	141,400	32.6	40,823	36.0	62,610	(a)	11,175	19.3	26,792	....
1938	165,201	16.8	57,832	41.7	62,694	0.0	12,386	10.8	32,299	20.5
1939	223,580	35.3	87,530	51.4	93,723	49.4	15,435	24.6	—26,892	—16.7
1940	313,456	40.2	134,018	53.1	124,482	34.5	20,285	31.4	34,671	29.0
1941	462,852	47.7	220,722	64.7	172,669	38.6	25,255	24.5	44,206	27.5
1942	585,440	26.5	299,559	35.7	201,447	16.7	31,366	24.2	53,038	20.0
1943	675,233	15.3	339,380	13.3	242,978	20.6	37,519	19.6	55,356	4.4
1944	905,600	34.1	438,552	29.2	267,295	10.0	47,768	27.4	151,985	175.0
1945	1,100,000	21.4	540,000	23.2	280,000	4.8	60,000	25.6	220,000	44.8

(a) Not comparable due to segregation of chemical manufacturing. (b) See Section 5 for definition of chemical uses.

Remarks: In Table 1 "Total Sales" for all years except 1945, were obtained from U. S. Bureau of Mines reports. "Distribution" for the years 1931 to 1944, inclusive, was obtained from the same source. All other volumes were estimated by the writers. The total sales volume includes all liquefied petroleum gases (propane, butane, and propane-butane mixtures) when sold as such. Until 1944 the sale of pentane when sold for any purpose other than motor fuel blending was included. It has been excluded since then. It does not include butane when blended with heavier petroleum fractions for motor fuel purposes. Intercompany sales transactions such as purchases of liquefied petroleum gases by one company from other companies and resold as liquefied petroleum gases, have been eliminated in order to avoid duplication of sales figures. The data do not reflect sales of liquefied petroleum gases used directly by the producer at the point of production, for fuel polymerization, solvent de-waxing, etc. Neither do the figures include sales of hydrocarbons to plants manufacturing synthetic rubber or aviation gasoline or their components.

G. G. OBERFELL *R. W. THOMAS*

This review is an annual contribution by the authors, and is the most comprehensive available of the liquefied-petroleum-gas industry. G. G. Oberfell is vice president in charge of research, and R. W. Thomas is manager of research and development for Phillips Petroleum Co., which company is in a dominant position in L.P.G. manufacturing operations.

petroleum gas is for household (domestic) purposes, with sales estimated to be 540,000,000 gal., an increase of 23.2 per cent over 1944. Although all restrictions on new domestic installations were removed for the last 4 months of 1945, nevertheless, inability to obtain necessary utilization equipment and appliances as well as manpower has kept new installations at a sub-normal figure. It is estimated that the domestic users as of December 31, 1945, were 2,050,000, representing an increase of 5.1 per cent over 1944.

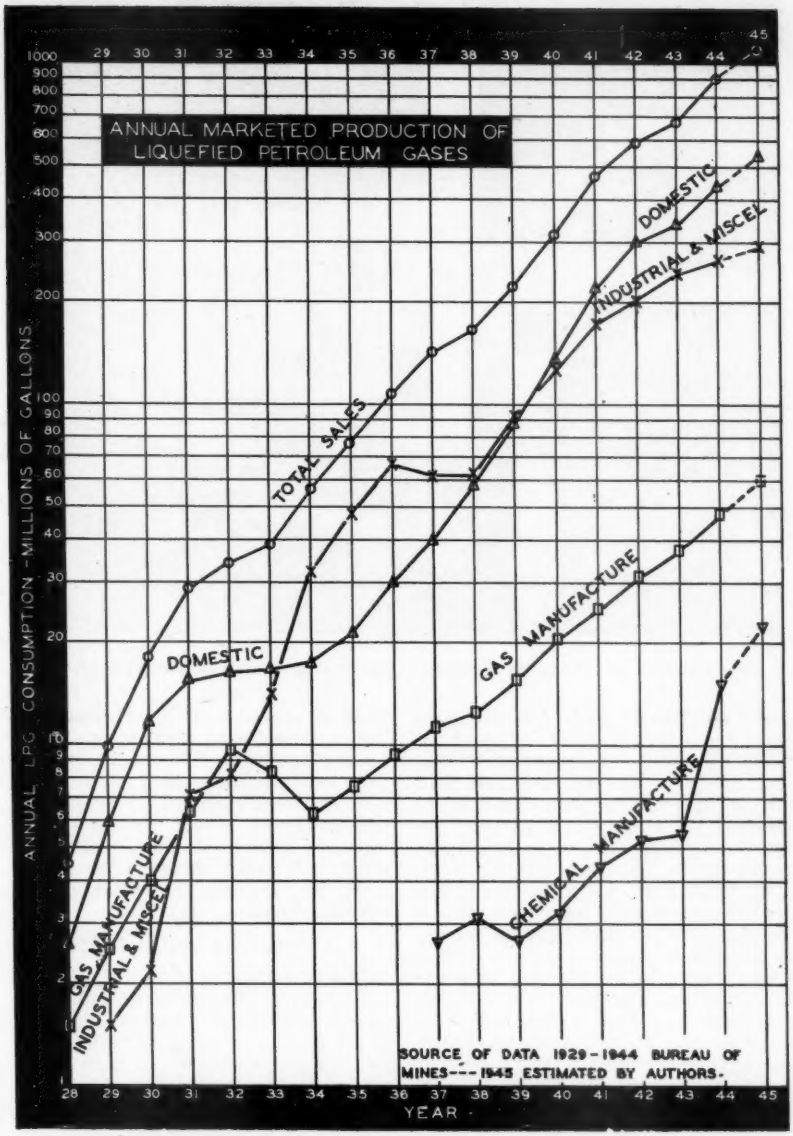
Large Pent-Up Demand

Because of the wartime restrictions in the form of limitation orders issued by the federal Government and because of the shortage of materials due to their use in the production of war products, a large pent-up demand for liquefied petroleum gases for use in homes beyond the gas mains now exists. Relatively few new installations were made during the war period since it was necessary to obtain PAW and WPB approval for war-necessary installations, all other installations being prohibited.

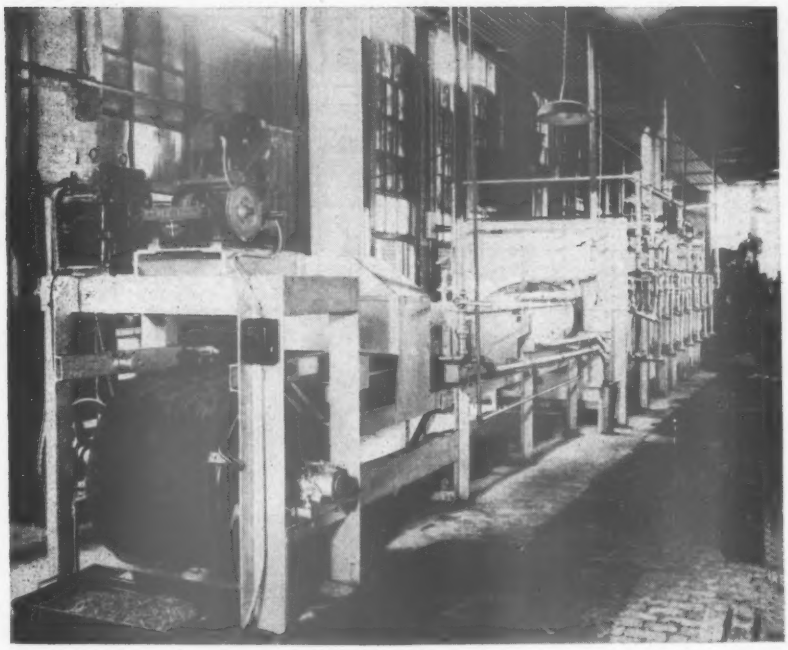
There is an apparent increase tendency to use more propane and less butane. Some installations have been converted from the use of butane to propane. This trend to a greater use of propane in proportion to butane is expected to continue.

To serve more homes efficiently and to better meet competition, many distributors have built new bulk stations and have improved their service organizations. Likewise, a large amount of new equipment of all types, including L.P.G. transport trucks, has been ordered.

Many new marketers and distributors have entered the L.P.G. business. Some of these newcomers are


ANNUAL MARKETED PRODUCTION OF LIQUEFIED PETROLEUM GASES
ANNUAL LPG CONSUMPTION - MILLIONS OF GALLONS
YEAR
TOTAL SALES
DOMESTIC
INDUSTRIAL & MISCEL
GAS MANUFACTURE
CHEMICAL MANUFACTURE
SOURCE OF DATA 1929-1944 BUREAU OF MINES--- 1945 ESTIMATED BY AUTHORS.

Bulk plant for distribution of propane in cylinders and tank trucks



Propane-fired and controlled atmosphere heat-treating furnace at a modern plant

just developing their organizations and consequently sold very little L.P.G. in 1945. It is expected that more distributors will enter this field during the coming year. To a great number of uninformed people, the L.P.G. business appears to be an opportunity to "get rich quick"; however, this is not the case. Adequate capital, merchandizing experience, a fruitful territory, and patience are required for financial success. It will be necessary for the industry to maintain constant vigilance at all times, and especially during this period of rapid growth, to insure the maximum safety, both from the standpoint of the consumer and the distributor.

It is interesting to note that a large amount of the increase in domestic L.P.G. consumption during the past year was due to greater use by present consumers. As new appliances become available, it is expected that the average consumption of L.P.G. by the domestic consumers will further increase above 1945 levels. With the increased standard of living it is reasonable to expect greater use of liquefied petroleum gases than heretofore, especially through the use of more gas-burning appliances in the average home.

3. Industrial Use of L.P.G.

It was estimated that the quantity used in 1945 for industrial fuel, internal-combustion-engine fuel and miscellaneous uses was 280,000,000 gal., which represents an increase of 4.8 per cent over 1944 uses. While the direct motor-fuel use has increased over the 1944 consumption, the quantity of L.P.G. used for other industrial purposes did not materially increase, because of reduced industrial-plant activities during the period of reconversion.

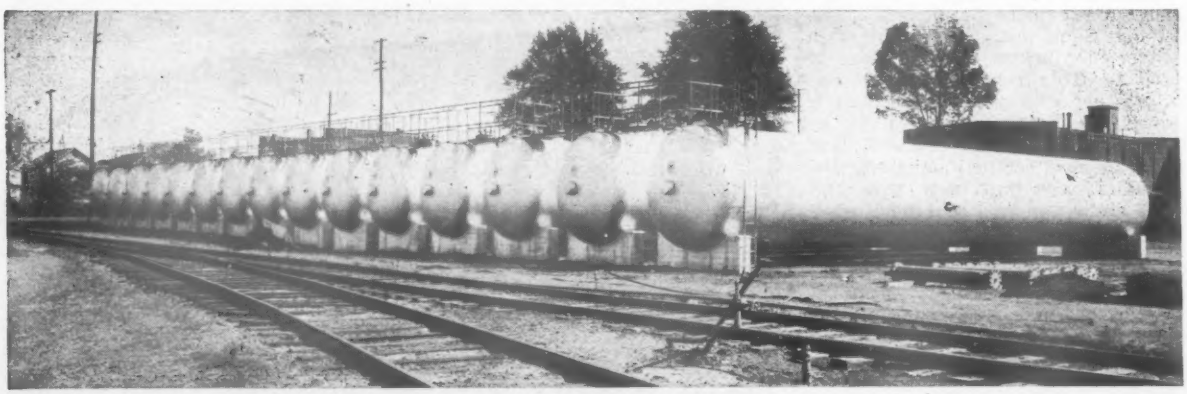
4. Gas-Manufacturing Use of L.P.G.

The quantity of utility gases transmitted in gas mains has shown a consistent increase during the past several years. To meet this increased consumption has taxed the resources of many utility companies. Although utilities in general have endeavored to keep their winter house-heating peak demand at a reasonable level, in a great number of cases these peak demands have reached such proportions that the installed equipment is no longer capable of supplying the required gas. To increase their gas-producing capacity in a minimum length of time and still secure maximum flexibility at reasonable costs, a number of utilities have installed liquefied petroleum gas facilities to produce supplemental gas for these peak periods.

In addition to the liquefied petroleum gas used for peak load shaving, a large quantity is distributed undiluted or diluted to various heating values. The sum of the L.P.G. used for peak-load shaving and for distribution in pipe lines has been estimated for 1945 as 60,000,000 gal. which represents an increase of 25.6 per cent over that consumed in 1944.

5. Chemical Uses and Other Demands for L.P.G.

The quantity of liquefied petroleum gas used in the chemical-manufacturing industry depends to a great extent upon the definition of chemical uses. After excluding the C_3 and C_4 hydrocarbons used for the production of aviation and automotive gasolines and for the production of synthetic-rubber components, which are large uses of propane and butanes, the quantity consumed in the production of chemicals is still a sizable amount of the marketed liquefied petroleum gases. It was estimated that 220,000,000 gal. of C_3 and C_4 hydrocarbons were used for such chemical manufacture during 1945. This is an in-



Tanks for a propane-storage system under construction by a gas utility

Here, for example, is a brief resume of actual results obtained from one UNISOL plant

- Mercaptan content is reduced from 0.06—0.11% to an average of 0.0007% as it leaves the unit.
- Instead of a loss of 1 to 2 octane numbers by doctor sweetening, Unisol treating increases unleaded octane number by ½ point.
- A material reduction in total sulphur.
- A substantial increase in tetraethyl lead susceptibility.
- Prior to installation of the process, 80 octane gasoline could not be produced. With Unisol treatment, a 3 cc. addition of tetraethyl lead results in an 80 octane product
- Refiner can now blend all straight run gasoline with cracked product to produce house-brand gasoline.
- A severe treating loss was practically eliminated.
- Total cost of reagents is less than ½¢ per barrel of treated gasoline.
- Initial pre-war cost of Unisol unit was amortized in 8 months.

This is a small 550 barrel per day plant. Greater economies result from larger installations.

More complete details concerning this unit are contained in our booklet No. 255. Ask for your copy today.

UNIVERSAL OIL PRODUCTS COMPANY

Main Office: 310 S. MICHIGAN AVE. CHICAGO 4, ILLINOIS, U. S. A.

LABORATORIES: RIVERSIDE, ILLINOIS

UNIVERSAL SERVICE PROTECTS YOUR REFINERY

crease of 44.8 per cent over 1944 consumption.

Since the quality of motor fuel has returned to its prewar level and in some cases increased beyond this point, the quantity of L.P.G., especially butanes, going into motor fuel has increased to a level almost equal to its prewar amount. Likewise since a number of alkylation units are operating to produce motor-fuel alkylate, sizable amounts of C_4 hydrocarbons are required in the form of isobutane and butylenes.

Although the butadiene plants using alcohol as feed have been shut down, most of the plants producing butadiene from petroleum are operating near or above their designed capacity. Therefore the demand for normal butane and butylenes for the production of butadiene has not changed with the cessation of hostilities, nor does it appear that this demand will decrease materially in the immediate future. Likewise the demand for propane used in the production of ethylene for styrene, another synthetic-rubber component, is not expected to decrease appreciably. Styrene is also used for the production of plastics. These uses are not included under chemical manufacturing in Table 1.

6. Industry Activities in 1945

During 1945 the liquefied-petroleum-gas industry was very active in promoting greater and more uniform safety regulations. The Liquefied Petroleum Gas Association (L.P.G.A.) continued to spend considerable effort in suggesting revisions of N.B.F.U. Pamphlet No. 58—"Standards of the National Board of Fire Underwriters for the Design, Installation, and Construction of Containers and Pertinent Equipment for the Storage and Handling of Liquefied Petroleum Gases as Recommended by the National Fire Protection Association." This work is very important since these standards serve as the basis of the laws, rules and regulations of most regulatory bodies.

In an effort to better serve the liquefied petroleum gas industry, and especially the distributor, the L.P.G.A. is in the process of being streamlined for enlarged activities.

The committee on gases, of the National Fire Protection Association, has been actively studying safety relief valve area requirements for liquefied-petroleum-gas storage tanks.

With the end of the Japanese war, the industry advisory committees, the permanent L.P.G. subcommittees of the natural gas and natural gasoline committees and the special L.P.G. joint survey subcommittee appointed by PAW were dissolved, but not, however, before the latter submitted to PAW an L.P.G. supply-and-demand estimate for the year 1945.

7. Supply of L.P.G.

As a result of the large requirement for C_3 and C_4 hydrocarbons during the war for the production of aviation gasoline and synthetic-rubber components numerous facilities to produce and separate these hydrocarbons were installed throughout the United States. As a result, the industry's ability to produce and separate liquefied petroleum gases is greater now than at any other single time in our history. The quantity of C_3 and C_4 hydrocarbons included as liquefied petroleum gases, and reported in this estimate, was considerably less than 10 per cent of the estimated total potentially available quantity of C_3 and C_4 hydrocarbons which could be made available at a price from gas processed by natural gasoline plants and at refineries from crude oil.

8. New Uses for L.P.G.

One of the most interesting of the recent developments has been the use of L.P.G. for flame cultivation (weed destruction, particularly in row crops). Because of the economic savings obtained by flame cultivation as compared to other methods of weeding, this method has aroused a great deal of interest in the agricultural industry, particularly in the South.

Of interest is the continued increase in the use of high-purity propane (free of unsaturates—propylene and butylenes) for the production of hydrogen by dehydrogenation processes. The hydrogen in many cases is then used for hydrogenation of vegetable oils and animal fats for the preparation of cooking fats, salad oils, and soaps.

The use of L.P.G. by industrial plants for many precise heating operations such as controlled atmosphere annealing with radiant tube furnaces, flame hardening and cutting, continued to expand.

Engineers Analyze Uses Of WEP Lines

(Continued from page 63)

tors of 83.3 to 100 per cent throughputs, the total cost of transportation of crude oil by the 24-in. line could be about 5 cents per barrel less than cost by tanker. This differential, after allowing for taxes chargeable against pipe-line transportation to which tankers are not subject, would be somewhat reduced but would vanish if the line had to be operated at 50 per cent load factor, equivalent to an average throughput of about 150,000 bbl. per day. Parenthetically, it may be noted here that such a throughput is much greater than the engineers believe could be obtained in normal times from the East and Central Texas oil fields for the big-inch line in competition with Gulf Coast refineries. It is believed these refineries would or could absorb most if not all of East Texas and Central Texas production, which, in 1944, amounted to a daily average of about 500,000 bbl. If it be assumed that as much as 125,000 bbl. per day of this crude could be diverted in normal times to the 24-in. line at Longview, the operator would have to reach out towards Southwest Texas for additional crude supplies. This would necessarily involve him in additional costs for such crude, either through his investment in additional pipe-line facilities of his own or through his paying additional transportation costs for crude brought to Longview by others. This condition would result in increased operating costs and would reduce, and probably entirely eliminate, the operator's ability to compete with tankers.

"The conclusion believed justified by these studies is that the 24-in. crude-oil system would more likely have to be operated at average load factors lower than required for most economic operation, and that under such conditions, unless the system were purchasable at a price lower than the Government might find acceptable, it would not be able to meet tanker competition on the basis only of transportation costs. These probabilities, added to advantages of tankers' flexibility in reaching different sources of crude-oil supply and different markets for products and taking into account the uncertainty of securing adequate supplies of crude from nearby sources in Texas for the 24-in. line, would minimize or eliminate entirely any real possibility of using this system postwar for transportation of crude oil to its Eastern terminals.

"Costs of transporting products by the 20-in. system Beaumont to New York are comparable with costs by tanker operating between Port Arthur, Tex., and New York.

"Total costs of transportation per barrel (exclusive of taxes) by the pipe line, at various load factors and throughputs, and by tanker, are summarized in Table 2. These costs are based on the same sources of information and methods of computation as were applied in determining the costs of transporting crude oil. For purposes of comparison, the total costs of products transportation by the 20-in. line are shown for purchasers' investment ranging from $60,000,000 down to $10,000,000. Tankers investment is estimated, as ranging from a valuation of $1,500,000 down to $1,000,000 per tanker. This compares with present-day tanker costs understood to range between $2,500,000 and $3,000,000.

"It will be noted that the costs of transportation of products by pipe line, exclusive of any allowance for taxes, are all higher than costs of tanker transportation, excepting where purchasers' investments would be $20,000,000 or less and in the improbable event that the system would

be operated, on the average, at about 100 per cent load factor.

"From these studies it is concluded that the 20-in. products system could not compete on a cost basis with tankers, and that taking into account their flexibility in handling a variety of products as offered by shippers and in effecting delivery of such products to various ports for distribution to different markets, there is no important possibility of using the 20-in. system for transporting products to its Eastern terminals."

The report also contained a discussion of the possibilities of using either the eastern or western half of the system, but concluded that the lines are too large for economical operation at the volumes which the markets are likely to provide for such means of transportation. The cost estimates were as follows:

Costs of Transporting Crude Oil and Products Longview and Beaumont to Norris City and From New York to Norris City

"The range in possible costs of transporting crude oil and products from either terminal to a point on the big-inch lines in District 2 is indicated in Tables 3 and 4. Costs are shown for purchasers' investments in the Beaumont-Norris City section of the 20-in. products line ranging from $27,000,000 down to $4,500,000 and for the New York - Norris City section ranging from $33,000,000 down to $5,500,000. For the 24-in. crude-oil line, costs are shown for purchasers' investments in the Longview - Norris City section ranging from $36,000,000 down to $6,000,000. These ranges in purchasers' investments for sections of each system are proportioned to the range in purchasers' investments for the total system on the basis of the ratio of miles of line in each section of each system to the total miles of line in each system.

California Legislature May Act in Tidal Land Suit

SACRAMENTO. — The U. S. Government's suit to establish owenrship of the ocean bed off the California coast is expected to impel action by the state legislature, which opened a special session this week. Charles W. Lyon, speaker of the Assembly, indicated two steps are likely. One would be passage of an act to delimit the seaward boundaries, this being among powers reserved to the states by the Constitution and by international law. The other would be adoption of a joint resolution to ask permission for the legislature to intervene in the suit as a friend of the court, file separate briefs, and appear by counsel from its own membership.

"Clearly the legislature should do everything within its power," said Lyon, "to oppose this suit."

Anchor Oil Co. Organized to Conduct Export Business

David L. Gordon, of Houston, vice president of Anchor Petroleum Co., Tulsa, and since 1942 its Gulf Coast

W. C. HILDEBRAND

DAVID L. GORDON

representative, is president of Anchor Oil Co., newly organized subsidiary which, with headquarters in Houston, will handle world-wide distribution of petroleum products, including liquefied petroleum gas. W. C. Hildebrand, Jr., Houston, formerly executive vice president and general manager of Maritime Oil Co., and W. A. Baden, Tulsa, vice president of Anchor Petroleum, are vice presidents of the new organization. All three men are well known in the foreign and domestic oil trade.

The new company's plan of operation, Baden said, will include coastwise and export shipping to Europe, Asia, and all South American countries, in addition to domestic shipping.

Anchor to Handle Tansel's Former Oil Business

Anchor Refining Co., Tulsa, has announced that hereafter it will handle all business transactions formerly conducted by Tansel Oil Co. Anchor Refining is a subsidiary of Anchor Petroleum Co., as was Tansel. Officers and personnel who served Tansel will represent Anchor Refining in the same capacities. Anchor Refining has branch offices in Minneapolis, Chicago, Kansas City, and Des Moines. Its principal office is in Tulsa.

DEATHS

Andrew Jefferson Faust, 85, former Illinois and Indiana oil operator, died December 31 in Olney, Ill. Faust was assistant superintendent of Romano-Americano Oil Co., a Standard Oil Co. (N. J.) subsidiary, in Romania from 1904 to 1907. He had served as mayor of Lawrenceville, Ill.

I. Frank Brown, 45, export representative for drilling and production tool manufacturers, died January 4 in New York. Brown started at 14 as a roustabout in California oil fields. He received promotions and in 1925 was drilling superintendent for Royal Dutch Shell at Sarawak, Borneo, where he drilled the first well. In 1930 he became consultant to the Soviet oil industry in the Grozny and Baku fields. Later he was foreign representative for Hughes Tool Co. In recent years Brown managed the export affairs of Baash-Ross Tool Co., A-1 Bit & Tool Co., Guiberson Corp., Fred I. Getty, Texas Rubber & Specialty Corp., International Stellite Corp., and Oxweld Acetylene Co.

Thomas Nelson Berry, 75, pioneer operator in Mid-Continent oil fields, died January 4 in Stillwater, Okla. He was one of the organizers of Mulberry Oil Co. and Cushing Gasoline Refining Co. Afterward he joined in the purchase of Blackwell Oil & Gas Co.

Charles C. Hall, 70, founder and vice president of Durametallic Corp., died December 26 in Kalamazoo, Mich. He was a pioneer in the manufacture of flexible metallic packings and rotary mechanical sealing devices.

Forrest Milton Towl, 81, retired board chairman of Southern Pipe-Line Co. and other pipe-line organizations, died January 3 in Brooklyn, N. Y. Starting with National Transit Co. and other Standard Oil subsidiaries, Towl joined Pacific Coast Oil Co. in 1902. From 1911 to 1932 he was president of various Standard Oil subsidiaries. During the first World War he built a pipe line across Scotland, enabling Allied naval vessels to bunker without being dependent on ports in the submarine - infested North Sea. Towl is credited with the discovery that pipe-line throughput could be increased by heating the oil.

George B. Blackman, 57, member of the drilling crew which brought in the famous Clayco gusher, opening the Electra oil fields, on April 1, 1911, died December 31 in Electra, Tex.

David D. Moninger, 68, member of the oil partnership, Laning & Moninger, of Wichita Falls, Tex., during the Burkburnett boom period, but in recent years a resident of Washington, Pa., died December 28.

George Harold O'Donnell, 66, who went to the Wyoming oil fields in 1916 as representative of the Carl Pforzheimer interests in New York, and later was purchasing agent for Continental Oil Co., died at Ogden, Utah.

Oran Dorsett Disch, 42, former Houston oil man, died December 13 in Venezuela, where he had been for 18 months. A graduate of Texas A. & M. College, Disch was associated in Houston with Humble Oil & Refining Co., Houston Pipe Line Co., and Reed Roller Bit Co., before going to Venezuela.

S.A.E. Ponders Atomic Power, Jet Engines, Car Design

by Arch L. Foster

DETROIT. — Election of L. Ray Buckendale, of Detroit, as 1946 president of the Society of Automotive Engineers was announced at the business session of the SAE annual meeting in Book-Cadillac Hotel here January 8. Buckendale, who is engineering vice president of Timken-Detroit Axle Co., succeeds James M. Crawford.

Among the new SAE vice presidents also elected were: Aircraft Engineering, George A. Page, Jr., director of engineering, Curtis-Wright Corp., Buffalo; Aircraft Powerplant Engineering, Earle A. Ryder, consulting engineer, Pratt & Whitney Aircraft, East Hartford, Conn.; Diesel Engine Engineering, H. S. Manwaring, chief engineer, Truck Research and Development Division, International Harvester Co., Chicago; and Fuels and Lubicants Engineering, J. C. Geniesse, process supervisor; Research and Development Department, Atlantic Refining Co., Philadelphia.

A quarter of a century of research has resulted in producing a synthetic lubricant, containing no petroleum components and made by combination of olefins from natural-gas hydrocarbons, D. B. Williams, Carbide & Carbon Chemicals Corp. and his collaborators told the SAE. Two types of product are made: (1) The LB, water-insoluble series of oils, useful for all types of motor, and other lubrication for which petroleum oils are employed; and (2) the HB-50, water-soluble type, used in hydraulic fluids, cutting oils, textile lubricants, metal drawing lubricants, etc. The trade name used is "Ucon," under which these products are sold.

Comparative Chevrolet engine tests showed that this engine remained clean longer with the synthetic oil than with the mineral oil. Corrosion of copper-lead bearings was less with the synthetic oil. Consumption was slightly less for SAE 30 Committee B-3 oil than for the Lb-300 synthetic oil, or 727 miles per quart for the mineral oil and 696 miles per quart for the synthetic. In vehicle tests the synthetic oil showed parts and bearings wear equal to that shown by the mineral oil. Combustion chamber deposits were less for the synthetic oil. The oil does not adversely affect gaskets and fiber timing gears. Engines can be started under low temperature conditions satisfactorily, it was found, with the synthetic oil.

In diesel engines, the heavy piston top scratching was almost absent when using the synthetic oils. Laboratory tests show that the film strength of the synthetics is intermediate between mild extreme pressure lubricants and straight mineral oils.

With aircraft engines the synthetic oils enabled operators to start the engines at minus 15° F. air temperatures, and even down to minus 30° F. without dilution by the fuel. Oil coolers remain relatively free of sludge; absence of any great amounts of engine sludge deposits was observed, what sludge was formed was composed chiefly of lead compounds from the fuel. Propellers hydraulically operated with the engine oil could be feathered easily at temperatures as low as minus 60° F. with the synthetic oil. Cleaning-up of engines operated with the LB series oil is considerably easier than when mineral oils have been used, the authors claimed.

Postwar Car Design

Modern motor cars use up entirely too much space for machinery and waste, W. B. Stout, famous car and engine designer, stated. He pointed out the engineering fallacies and mistakes in present-day car design and showed how these mistakes can be remedied.

"In the industry wants it," the internationally known designer of the famous Scarab rear-engined car, stated, "by 1947 they can have a vehicle of Ford - Chevrolet - Plymouth size, with a over-sized super-Cadillac interior, . . . half the weight of standard cars, twice the economy of present-day cars in driving, a visibility which does away with corner posts and their very definite danger . . . ."

Jet Turbines

We already have good evidence that, in jet engines we can attain easy starting, service operation without flame blowout at all speeds, ensure safety from fire risk, prevent carbon deposition in the burners of these newest power plants and avoid vapor lock of the fuels used, said Frank C. Mock, of Bendix Aviation Corp. Considering burner temperature as the limiting factor, Mock stated that the engine should operate at any point between 1,500° F. and the heat produced by the minimum amount of fuel needed for deceleration and idling operations. We now have too much trouble starting, minimum fuel rate for establishing flame gives too high a temperature; throttle must be "nursed open" carefully to avoid blowing out the flame, and the engine may die if the throttle is closed too quickly. Also, carbon deposition, smell and smoke haze in the exhaust indicates combustion in present turbines is not as good as desired, he added.

Atomic Power Application

Present-day limits of application of atomic power seem to be in the realm of the heat-transfer problems and high-temperature properties of available alloys. The billions of degrees of temperature inherent in atomic power can be utilized, after research and development, for stationary power plants, ships, and jet propulsion of large planes and rockets, Dr. J. R. Dunning, Columbia University, said. "It seems unlikely that atomic power will ever really replace our common fuels, in most application," Dr. Dunning said. "This new fuel is likely to be a supplement to existing methods. The immediate applications seem to be in the premium-fuel field, where the special advantages of atomic power outweigh costs."

"Much development must be done," Dr. Dunning said, "before atomic power finds wide applications." Cheaper methods of producing U-235 are in sight, and fissionable materials other than plutonium, some yet to be discovered, may aid in large-scale production. Uranium is about as abundant as copper, it is claimed, yet is uncommon in high-grade ore. Dr. Dunning said that this energy can be degraded, and used at lower levels of temperature. Industrial applications do not require highly concentrated U-235, and materials outside the highly explosive range will serve well, he stated. If the next war does not destroy all the cities over 50,000 population within the first few hours the war will not succeed, he believes. The burning of low-grade materials by conversion with U-235 is said to offer promise of atomic energy costs below those of coal, Dr. Dunning intimated.

Use of aircraft design and production methods to the building of automotive equipment will bring appreciable reduction in weight, Mac Short and W. E. Miller, Lockheed Aircraft Corp., declared at the meeting. Bumpers can be reduced to half present weights by using cast Dural sections, they said. Aluminum sheet and cast sections can be used as secondary body parts. How far weight reduction can be carried out in motor cars depends on factors of development and adaptability, they believe.

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Effect of Fuel Properties on Diesel-Engine Performance

by F. G. Shoemaker and H. M. Gadebusch *

GAS oils, such as generally supplied as diesel-engine fuels, are normally identified by a number of physical and chemical inspection data intended to insure uniformity during the refining process. Among these properties are found gravity, viscosity, flash, fire and pour points, distillation characteristics, carbon residue, sulfur content, water and sediment, ash, neutralization number, and color.

Viscosity and pour point insure fluidity of the fuel at all temperatures, sediment and ash show the percentage of inorganic contamination, and water as well as neutralization number are a measure unfilterable contaminating materials. The heat content of a fuel oil is determined by the carbon and hydrogen content and is closely related to its gravity. Combustion residue may be judged from the distillation recovery and color of a fuel oil, both of which are indicative of its content of undistilled residual material. A direct measurement of the combustion residue is given by the Conradson carbon test and the sulfur content. The distillation temperature range is representative of the fuel's vaporization characteristics, and the flash and fire points indicate its inflammability.

Ignition quality.—From the conditions under which ignition occurs in a compression-ignition engine, it becomes obvious that neither the flash nor the fire point of the fuel can be of any significance since both are determined by ignition from an outside source.

In search of a proper expression for the self-ignition quality of diesel fuels, numerous methods have been therefore employed in the past. Direct measurement of the spontaneous ignition temperature by bringing fuel drops in contact with a hot plate was found to be unsatisfactory, since the droplet size as well as the material of the plate affect the results in wide limits.

Since practical experience has shown fuels of paraffinic composition to produce smoothest diesel engine combustion, the paraffinicity of the fuel has also been used as criterion of its ignition quality. Viscosity-gravity constant, aniline number and a combination of aniline number and gravity known as "diesel index" have served as indirect measures of paraffinicity.

Since satisfactory correlation of these expressions with actual engine performance could not always be obtained, and engine test method comparable to the well-known octane-number determination for gasoline was developed. By this method the duration of the ignition delay period of a fuel oil is compared with the delay period of blends of two reference fuels. cetane and alpha-methyl naphthalene. The ignition quality of a fuel is rated in "cetane numbers" according to the percentage of cetane contained in the blend producing the same ignition delay as the fuel under test.

Although a reasonably good correlation of cetane number and spontaneous ignition temperature can be obtained, it is obvious that the diesel index of a fuel oil is of no more importance than to insure uniformity of different shipments from the same source. While vaporization and self-ignition characteristics of diesel fuels can thus be rated in some manner, little is so far known about the factors governing the combustion process.

Diesel-Engine Combustion

Since both power output and fuel consumption of an engine must be closely related to its combustion process, a short analysis of the combustion in a compression-ignition engine

*Detroit Diesel Engine Division, General Motors Corp. Condensed from the paper presented at the S.A.E. annual meeting, Book-Cadillac Hotel, Detroit, January 7-11.

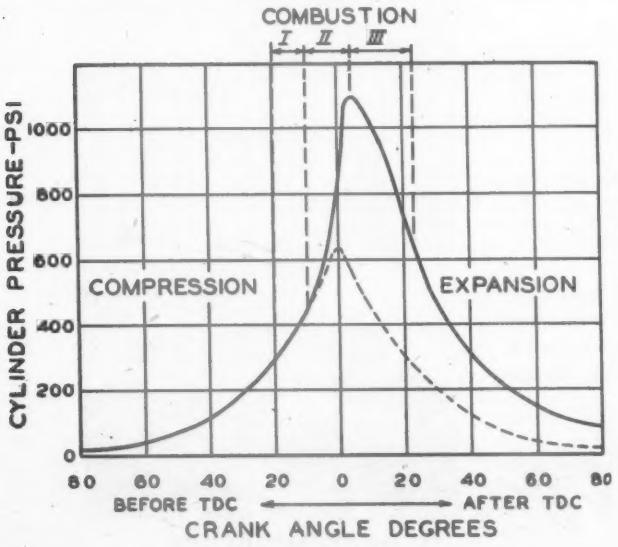


Fig. 1

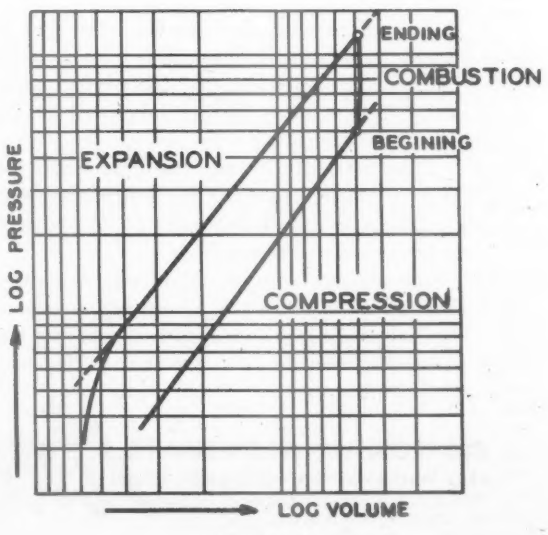


Fig. 2

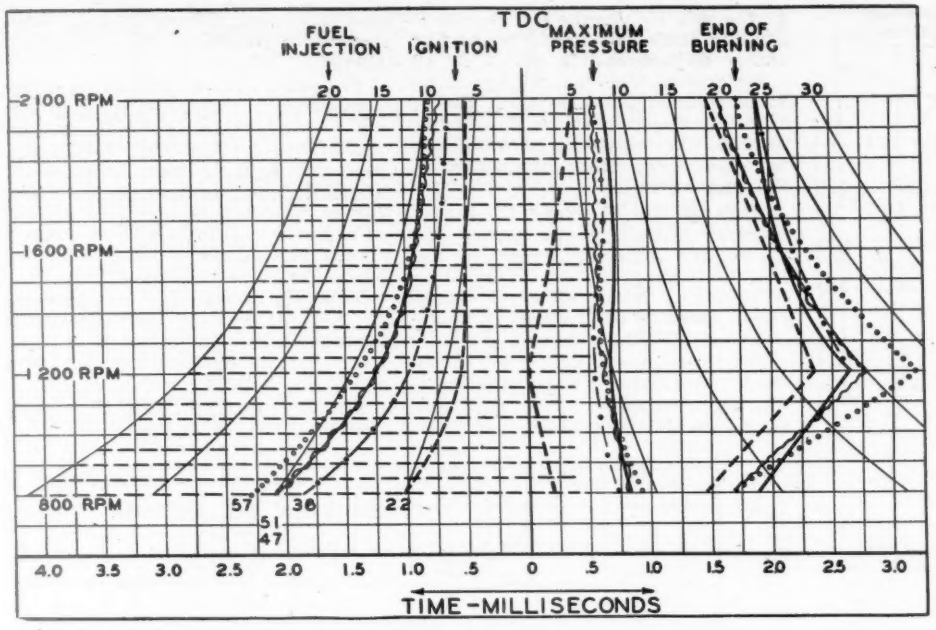


Fig. 3

may be in order. Cylinder-pressure observations have shown that transformation of the fuel's heat content to mechanical power takes place in three distinct phases as shown in Fig. 1.

For a certain time element after the beginning of the fuel injection the cylinder pressure continues along its normal compression cycle. During this period of ignition delay the combustible mixture is prepared by vaporization of the fuel droplets as they penetrate into the air charge. Following the spontaneous ignition of the fuel vapor, a period of rapid pressures rise can be observed, which terminates in a peak appearing shortly after the piston has passed the top dead center. Finally, the remainder of the injected fuel continues to burn at a slower speed for a considerable period of time until polytropic expansion of the charge begins.

From knowledge of these three phases as revealed by indicator diagrams, it can be seen that ease of vaporization and ignition appear to influence the delay period. Further progress of the combustion must be governed by other factors, particularly by the chemical composition of the fuel which thus enters into the discussion as a third major factor.

Investigations of the effects of fuel composition are greatly complicated for two reasons. First, because of the fact that natural fuels are composed of numerous molecularly different components; and second, on account of the intrinsic relation of their physical properties to their chemical composition. Thus it is possible to ascribe a given engine operating characteristic to any one of several related fuel properties, only one of which can have actually influenced the results.

Full-Load Performance

In view of the changed fuel-supply situation and the importance of better understanding of the effect of the three major fuel properties on the combustion process, a series of tests were conducted on a multicylinder, direct-injection, two-cycle diesel engine of General Motors manufacture. To measure the prevailing cylinder pressure, one of the cylinders was equipped with a balanced diaphragm research-type indicator.

Beginning as well as ending of the combustion were obtained from a logarithmic plot of absolute pressure vs. cylinder volume (Fig. 2). The abrupt change in slope of the compression and expansion lines indicates the points at which combustion begins and ends.[1] Brake horsepower and fuel consumption were measured in usual dynamometer practice and indicated horsepower values were obtained from the indicator diagrams as well as from the motoring friction.

Test fuels.—Twelve test fuels were procured containing straightrun as well as thermally and catalytically cracked materials and ranging in ignition quality from 22 to 65 cetane number and in volatility from 432° to 606° F. at the mid-boiling point. Their composition included some predominantly paraffinic fuels as well as various mixtures of paraffinic, olefinic, aromatic, naphthenic, and isoparaffinic constituents such as obtained from natural stocks by different refining processes. In addition, pure cetane was employed for some of the tests.

Besides knowing the estimated general composition of the fuels, the bromine number was obtained as a measure of the olefin content and the specific dispersion values[2] used as criterion for the content of aromatics.

Cetane Group

Cetane group.—Table 1 shows the first group of five fuels investigated for the effect of the cetane number. To isolate at least one of the three

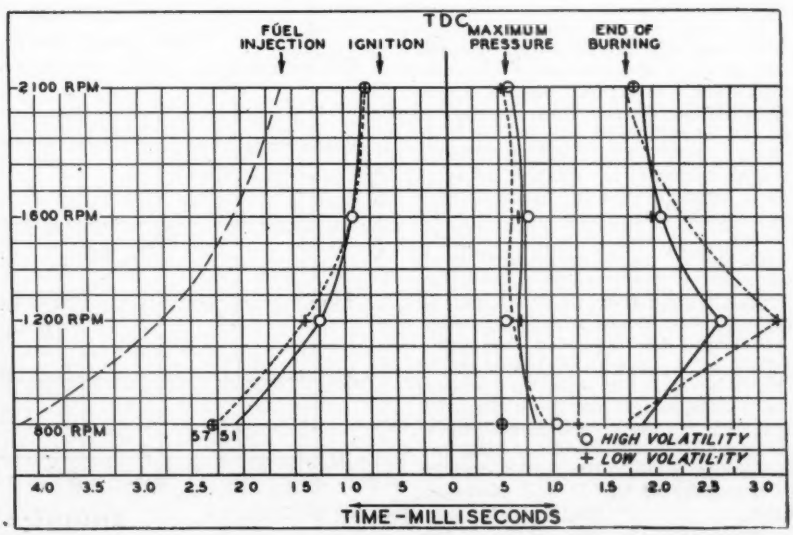


Fig. 4

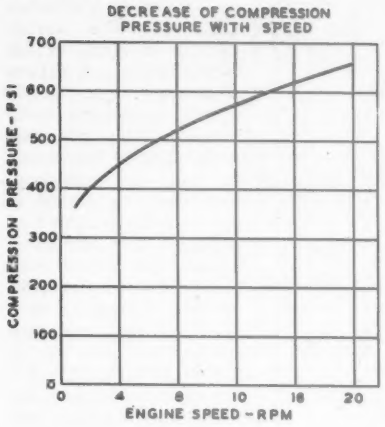


Fig. 5

TABLE 1

Cetane No.	Volatility F.B.P., of	General composition	Olefins (bromine No.)	Aromatics (spec. dispersion)
57	649	P	1.4	109
51	638	P,N,A	2.1	122
46	610	P,A,IP	2.1	137
36	642	P,O,IP	18.1	107
22	620	O,IP	27.0	102

P = Paraffins N = Naphthenes
A=Aromatics O=Olefins IP=Isoparaffins

variables as much as possible, these fuels were selected for constant vaporizing characteristics. The five fuels included a spread of only 29° F. in their final boiling points. A graphical representation of the full load results obtained with these fuels is given in Fig. 3.

Since determination of the combustion speed was one of the main objectives of this investigation, the abscissa shows elapsed time in milliseconds before and after the top dead center. The thin lines converging towards the top of the diagram indicate equal crank angle and the duration of the injection is outlined by the cross-sectioned area.

A study of this diagram reveals first that the ignition-delay periods extend over approximately the same crank angle at all four engine speeds. In other words, less time is required to ignite and burn the fuel at high engine speeds. The fuels of different cetane rating show ignition delay in their respective order at the various speeds with exception of the 46-cetane fuel whose curve coincides with that of the 51-cetane fuel at all but the top speed. At the 1,600-r.p.m. point all three fuels of 57, 51, and 46 cetane show identical ignition delay.

Scanning the tabulated fuel properties for a possible explanation of this behavior, it is seen that neither the boiling range nor the olefin content of these three fuels is materially different. The only distinguishing factor is the materially higher content of aromatics of the 51 and 46-cetane fuels.

Considering the next phase of the combustion, it is found that in spite of the relatively large differences in ignition delay only the 22-cetane fuel shows an appreciable effect of its later ignition. This fuel reaches maximum cylinder pressure much earlier than the other four and is, as a matter of fact, the only one showing the pressure peak before completion of the fuel injection.

Although the 51-cetane fuel has a tendency to burn slowest during this period, the differences between the four fuels appear to be too small to indicate any major effect of cetane rating above 36 on the time of maximum pressure development.

The final combustion period shows several interesting points. In general, the higher-cetane fuels burn faster than even the 57-cetane fuel at 2,100 and 800 r.p.m., falling back to their respective places at the 1,200-r.p.m. speed.

The much earlier termination of the combustion at the lowest speed of 800 r.p.m. is due to an air deficiency of the engine for the high fuel input used during these tests. Later work at reduced fuel delivery proved these curves to continue normally in the direction given by the three higher speeds indicating the same time interval for normal combustion.

Volatility group.—For investigation of the influence of the vaporizing characteristics, a group of four fuels were chosen whose properties are shown in Table 2.

The ignitability of these four fuels varies within four cetane numbers

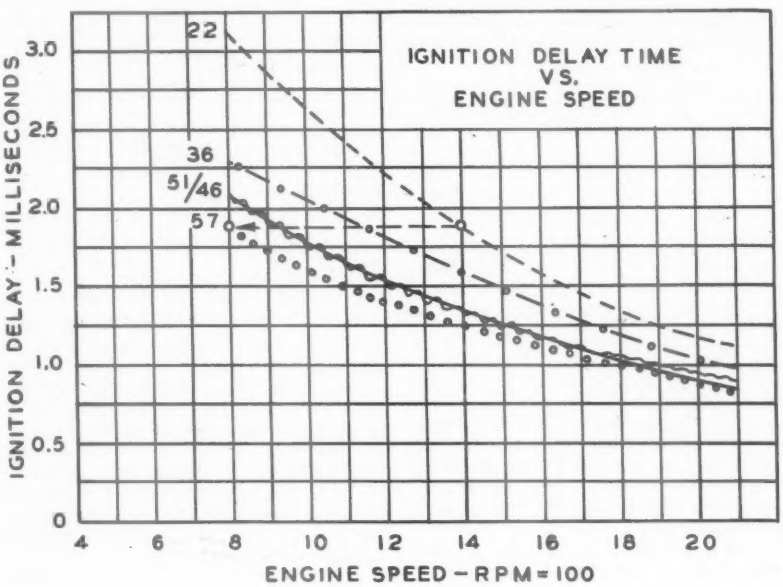


Fig. 6

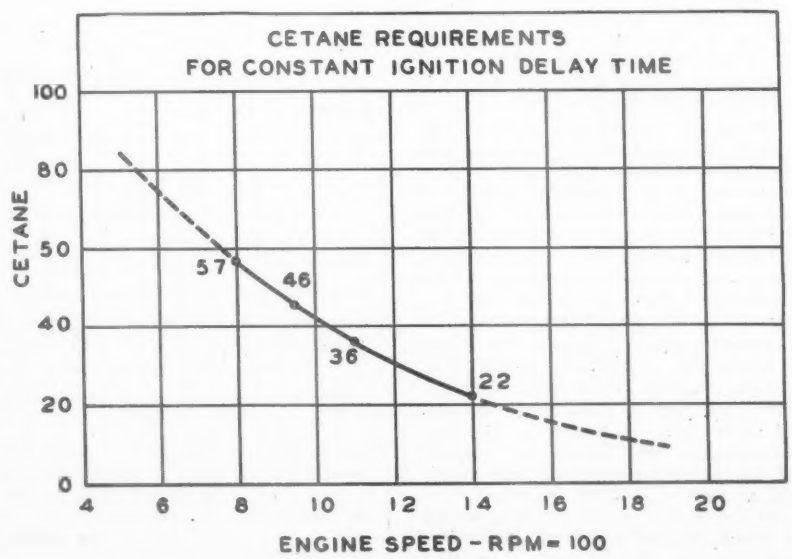


Fig. 7

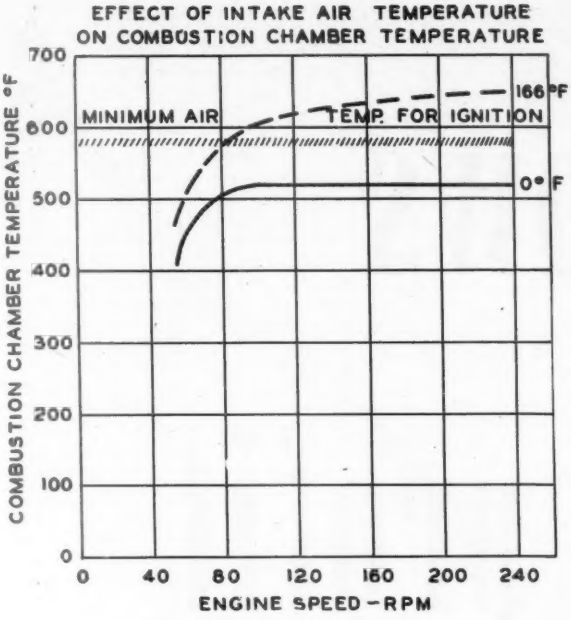


Fig. 8

TABLE 2

Cetane No.	Volatility F.B.P., of	General composition	Olefins (bromine No.)	Aromatics (spec. dispersion)
51	542	P,N,A	2.4	114
51	638	P,N,A	2.1	122
47	686	P,N,A,O	18.6	118
50	726	P,N,A,O	8.0	118

P = Paraffins N = Naphthenes
A = Aromatics O = Olefins

while their final boiling points differ as much as 184° F. Their aromatics content is in the same order but their olefin content covers a wide range. Fig. 4 contains the results obtained with these fuels added to those of the cetane group.

The ignition delay of all fuels of the volatility group is practically alike and well within the range of the corresponding fuels of the cetane group. Maximum cylinder pressure is reached at approximately the same time as before and the location of the volatility-group fuels at the end of the final burning period indicates likewise that no important influence of the boiling range appears to exist on the pressure development during combustion at full load.

Identical results were obtained in the part load range down to 50 per cent load and for all fuels tested neither power output nor fuel consumption showed greater variations than those normally traceable to the slightly different fuel input to the influence of viscosity and gravity and the differences in heating value. It must, therefore, be concluded that as far as combustion, power, and economy are concerned, fuel variations within a wide range of properties have no significant effect on this type of a direct injection engine over the normal range of working loads and speeds.

While high-speed diesel engines at normal operational speeds and reasonable load factors present ideal combustion conditions, thus tolerating a wide variety of fuels with apparently equal satisfaction, the wide speed and load range required of automotive engines creates operating conditions which influence the choice of fuels that will give the greatest operational durability.

Not only is the engine expected to start without undue preparations even after prolonged exposure to low atmospheric temperatures, but light-load operation including the idling range is also a necessity for many types of automotive service.

Under these conditions, the identical fuel properties are involved as at full load, but their importance is magnified by factors adverse to vaporization and self-ignition.

Fig. 5 shows the variation of motoring compression pressure as a function of engine speed throughout the normal running range. Comparable curves for various compression ratios were also published by P. M. Heldt.[3] The instantaneous compression temperatures vary in a similar manner. Under actual firing conditions, however, the temperatures of the combustion-chamber walls is considerably higher and increases with both speed and load.

This increase of the combustion-chamber temperature tends to compensate for the decreasing time interval available for injection, vaporization, and combustion as shown by Figs. 3 and 4, thus resulting in a combustion process of practically constant angular interval throughout the entire speed range. Furthermore, there is no indication that the speed of compression-ignition engines is limited by the combustion process.

Fig. 6 shows the influence of engine speed on the ignition delay time for the five fuels of the cetane group previously described. To maintain the same time interval for self-ignition at 800 r.p.m. as produced by the 22-cetane fuel at 1,400 r.p.m., an increase of the ignition quality to 57 cetane would be indicated. Plotting the corresponding values as cetane requirement vs. engine speed, results in the curve contained in Fig. 7.

With such a wide variation of the engine ignition capacity over the speed range, it becomes understandable that automotive types of service such as city coach operation, where low-load factors are the rule, make it desirable to employ special fuels. Practical experience has shown that for operations of this type, volatility and cetane rating have similar effects on over-all engine operation, and a deficiency of one can be offset by an increase of the other.

Western "stove oils," for example, with usually less than 40 cetane but final boiling points as low as 560° F. gave equal operating satisfaction as No. 3 fuel oils with 675° to 700° F. final boiling point and 50 to 55 cetane rating. For city service where drastic restrictions are usually imposed on exhaust smoke and odor, most operators have found fuels preferable with a final boiling point of not more than 530° F. and better than 50-cetane number. Superior diesel-engine fuels must possess both of these important combustion qualities.

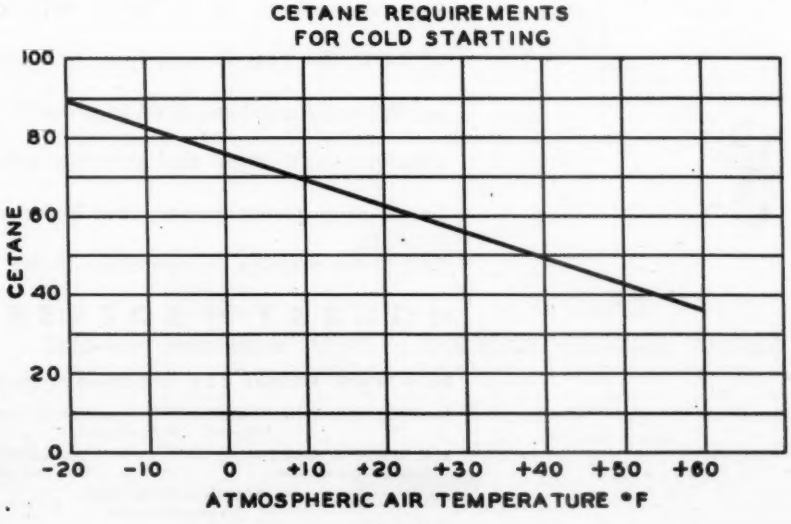
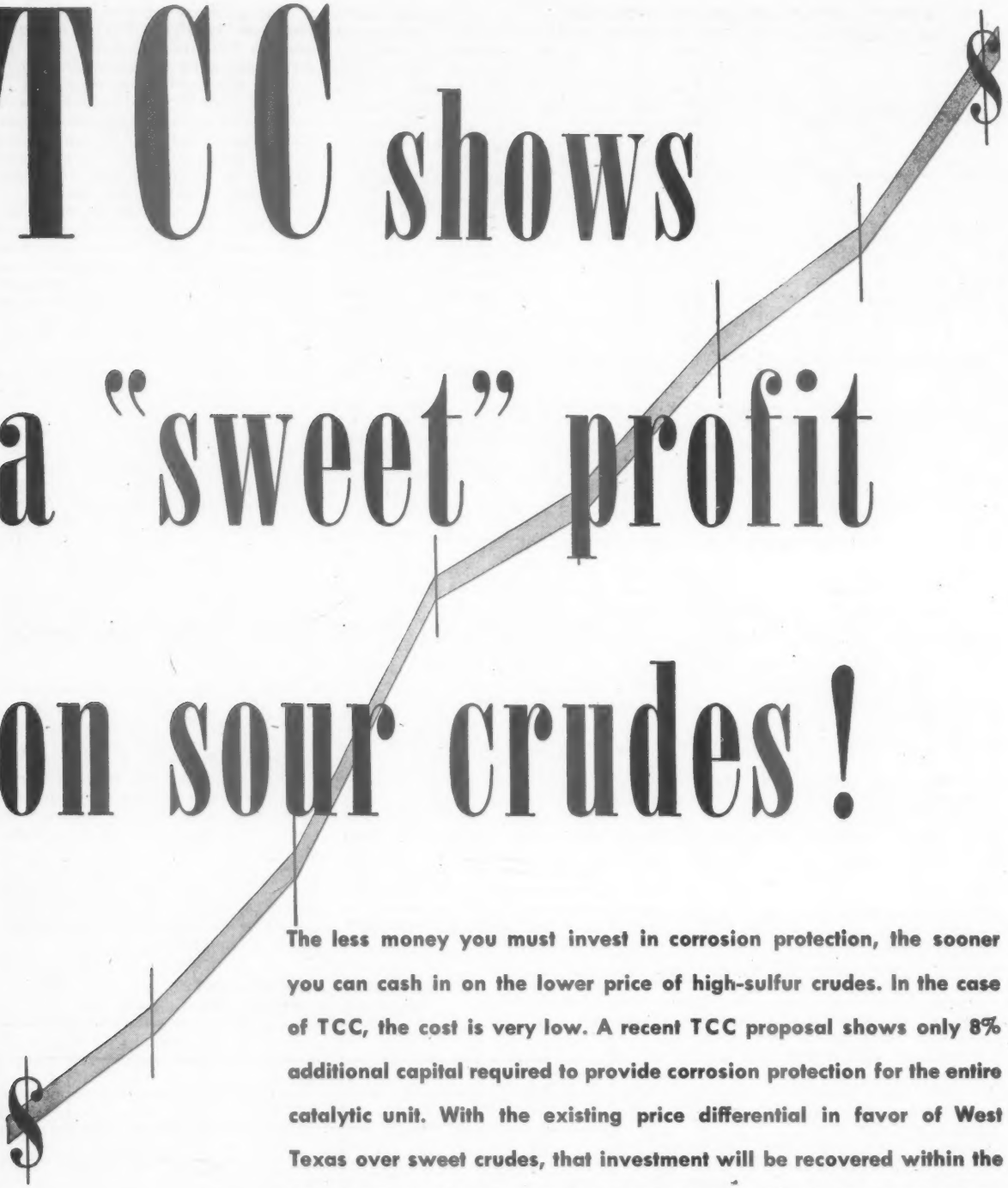


Fig. 9

TCC shows a "sweet" profit on sour crudes!



The less money you must invest in corrosion protection, the sooner you can cash in on the lower price of high-sulfur crudes. In the case of TCC, the cost is very low. A recent TCC proposal shows only 8% additional capital required to provide corrosion protection for the entire catalytic unit. With the existing price differential in favor of West Texas over sweet crudes, that investment will be recovered within the first three months of operation. From then on the saving is all velvet.

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HOUDRY CATALYTIC PROCESSES

During the war period, tests were conducted for the Army Air Forces with a mixture of 75 per cent aviation gasoline and 25 per cent lubricating oil as emergency fuel for diesel generator sets. The volatility of this mixture was very high but its cetane rating was only 21. Both the C.F.R. engine operator as well as the personnel conducting the tests on the multicylinder engine reported that unusually smooth combustion was obtained for a fuel of such a low ignition quality. A subsequent determination of the combustion data of this mixture revealed identical ignition lag with a 21-cetane fuel of natural composition but a 42 per cent longer duration of the combustion.

Cold starting.—It is thus seen that frequent operation at light loads and low engine speeds increases the fuel requirements of volatility and cetane rating. These fuel properties become even more important when the engine must be started in cold weather, and operated with low cooling water and intake air temperatures.

Starting conditions at 0° result in combustion-chamber temperatures as shown in Fig. 8. Even continued cranking above 100 r.p.m. does not suffice to raise the air temperature to the level required for ignition of the fuel as determined by the normal starting conditions with 160° F. air temperature shown by the upper curve. A number of carefully correlated cold starting tests by three different laboratories have produced the relation between cetane rating and starting temperature shown in Fig. 9.

According to these data, fuel of approximately 80 cetane would be required to start a compression-ignition without special preheating equipment at an ambient temperature of 0° F. Tests recently conducted with diethyl ether either as a direct addition to the fuel or separately injected into the intake air, have produced instant cold starts at temperatures as low as —20° F. with fuels in the 50-cetane range.

In the absence of any other explanation, it is inferred that the lower starting temperature is the result of the high volatility of the ether since its cetane rating as ordinarily determined in a hot engine is only around 50.

This unusual behavior of ether emphasizes the importance of rating the ignition quality of fuels also in the low-temperature range where ignition is equally important.

Conclusions

For the type of engine under investigation the increase in temperature and pressure with increasing load and speed in such that for any given fuel the angular interval measured in crankshaft degrees from the beginning of injection to the end of combustion, is practically constant for all speeds over the normal operating range.

A wide variation of those fuel properties which are normally associated with the burning characteristics of diesel fuels, is of insignificant influence on the combustion of the General Motors two-cycle direct-injection engine under normal load and speed conditions.

The power developed in a diesel engine appears to be directly proportional to the heating value of the fuel injected and is independent of its cetane rating volatility, chemical composition and molecular structure. Both the cetane rating and the volatility have a marked effect on cold starting and light load operation where the ignition capacity in the cylinder is reduced.

One of the main factors governing the requirements of diesel-engine fuels is the type of service in which the engine is operated. For automotive engines for highway vehicles and other similar services the engine must not only run well at high speed and maximum power, but also perform satisfactorily under operating conditions involving light engine loads and low speeds, and particularly cold starting conditions.

These operating conditions must therefore be considered as the criterion by which automotive diesel fuel specifications must be established.

Acknowledgment

Acknowledgment is due to Shell Oil Co., Inc., which supplied the majority of the test fuels and their analysis data together with the valuable advice and assistance of L. A. Wendt. The combustion tests described were conducted by Dr. L. L. Withrow and the late Dr. A. S. Fry of the Research Laboratories Division of the General Motors Corp. in the engineering laboratory of the Detroit Diesel Engine Division.

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Huge Plastics-Production Program Seen; Output Increase 300,000,000 Pounds

THE former volume plastics materials such as acrylics, cellulosics, phenolics, ureas, and the vinyl resins will soon be produced at a substantially greater rate. However, a much higher percentage increase in production will be shown in polyethylene, polystyrene, the new cellulosics, and nylon. W. S. Landes, president of the Plastics Materials Manufacturers Association, announced that more than $107,000,000 will be spent on new production facilities for the manufacture of plastics materials in the next 18 months. As a result of this expansion output of these materials will be increased by 300,000,000 lb. a year.

The current demand for plastics materials greatly exceeds the supply, but relief is expected by 1948. For example, thermoplastic moulding materials will show a 33 per cent gain in output in the first quarter of 1946 and a 150 per cent increase over the present rate in the second quarter. Landes stated that the labor supply in this industry is critical.

Last year a new process was perfected for producing (for the first time in this country) propionic acid from natural gas at a reasonable cost. This process is operated by the Celenese Plastics Corp. at Bishop, Tex. Cellulosic plastics are produced as a result of many years of research devoted to the study of chemical reactions to introduce organic acid or alcohol radicals into the cellulose molecular chain.

Many plastics materials are derived from petroleum, as shown in the accompanying chart.

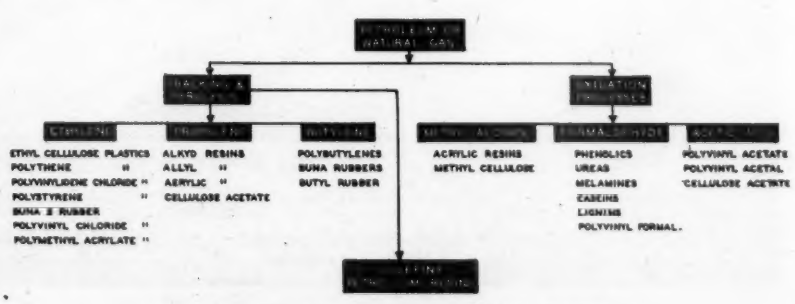

Chart showing plastic materials derived from petroleum

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Efficient Reconditioning and Material Handling Program Developed at Warehouse

by Paul Reed

Here are described some ideas that have made for more effective use of labor in the warehouse of Phillips Petroleum Co., at Oklahoma City.

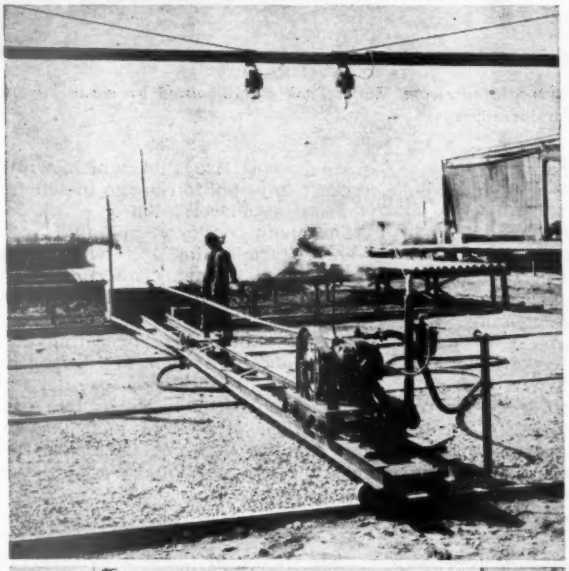
FOR the handling and reconditioning of large stocks of oil-field material at an important central warehouse, improvements in certain procedures are capable of increasing efficiency so that production operations may be more effectively served.

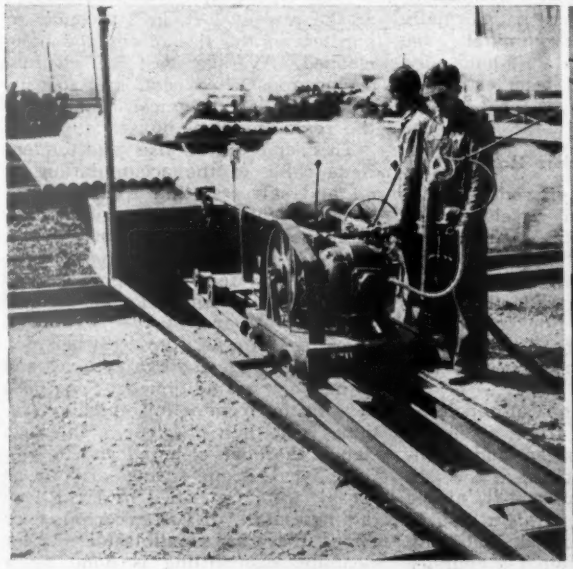
In this article several unusual advances in practices are discussed which were observed at the central division warehouse of Phillips Petroleum Co. at Oklahoma City.

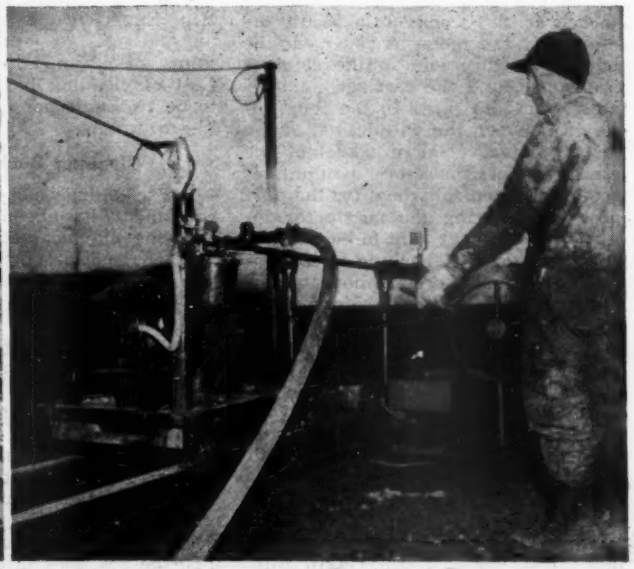
Removal of paraffin from tubing has been commonly accomplished by manual operations. These have certain disadvantages because of the amount of time consumed and because of objections by employes engaged in the work for extensive periods.

Special semiautomatic electric-driven inside-cleaning machines have been developed by the Phillips company through the exchange of ideas between the Panhandle and Oklahoma City warehouse staffs. The original design was devised by Carl Ellig, salvage shop foreman, with the assistance of W. E. Reno, warehouse superintendent at the Panhandle warehouse, Borger, Tex., where the first equipment of this type was made and installed. Profiting by what had been accomplished, J. H. Pierce and the staff at the central division warehouse, Oklahoma City, fabricated a tubular inside-cleaning machine at the warehouse shop for use in the yard at that location. In doing this they incorporated certain improved features. This apparatus is suitable for cleaning tubular material in diameters from 2 to 10 in.

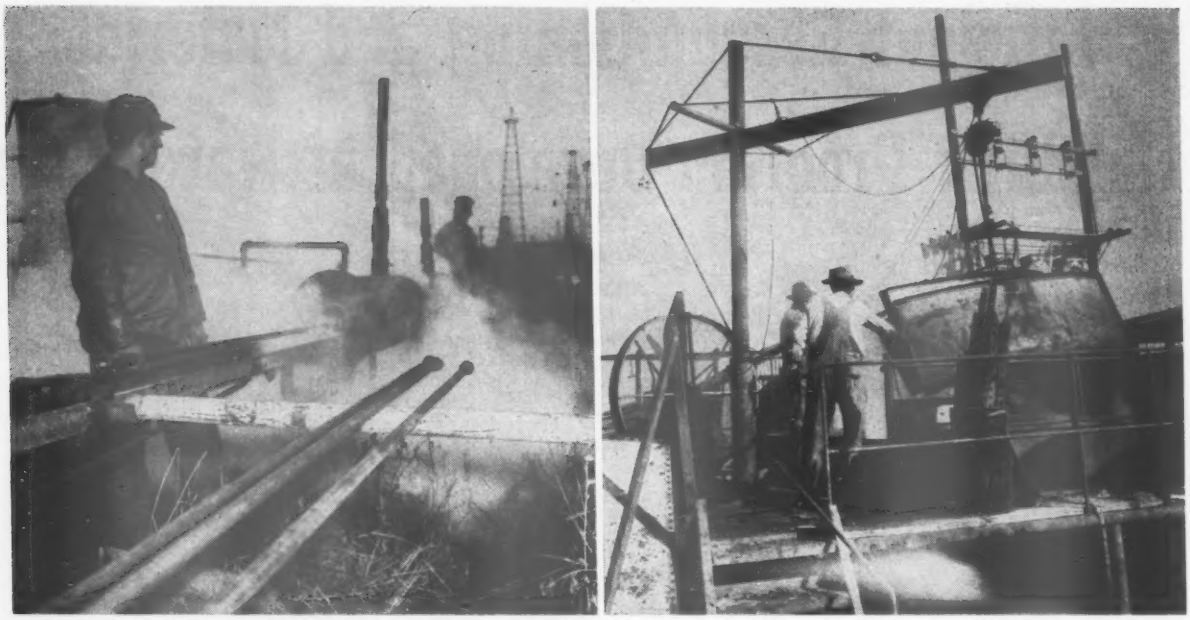
The most conspicuous feature of the special equipment is a carriage which travels back and forth on a movable







Left: Tubular inside-cleaning machine when the carriage is at the end of the track where its movement is reversed when an automatic switch on the carriage contacts a pin on the arm attached to the track. Elevated reelatype equipment holds cable out of the way of operations. Lower left: Carriage at the forward end of the track. Lower right: Operator manipulating control wheel to center the nozzle for insertion in a joint of tubing to be cleaned



Left: Chain conveyor moving sucker-rod into chamber for cleaning by chemical and steam. Right: Tank plates hoisted by electric equipment for cleaning-vat operations

track each time the nozzle for injecting a steam-and-chemical mixture, at the end of 1-in. pipe, is inserted and withdrawn from a joint being cleaned.

Movable Track

Tubular material to be cleaned is piled on a pipe rack which is 40 ft. wide. The movable track is made of 3 by 5-in. I-beams spaced 2 ft. apart. The traveling carriage is operated by a 1¼-hp., 440-volt motor connected with weatherproof cable which is held out of the way by elevated reelatype equipment. At the point where the nozzle is withdrawn for a short distance from the pipe being cleaned, an automatic switch on the carriage contacts with a pin on an arm attached to the track; as a result the motion of the motor is reversed; the backward movement of the carriage is stopped, and the carriage immediately starts forward. In the short interval between the withdrawal of the nozzle and reversal of travel of the carriage, an operator manipulates spokes of a control wheel for the purpose of centering the nozzle for insertion in the next joint to be cleaned. Operation of the machine is so simple that a man can learn how to handle it in an hour. As a safety measure, all moving parts are painted red; stationary parts are black.

Perforated nozzles of various sizes are available which are suitable for various diameters of joints to be cleaned. Immediately behind the nozzle on the 1-in. steam pipe is a swab made of canvas belting material.

Steam at 90 lb. pressure is furnished by a boiler through 20 ft. of 1-in.-i.d. hose of synthetic material. Into the stream of steam, Oakite railroad cleaner is pumped by a plunger-type pump driven by a ¼-hp. electric motor at the rate of 1 gal. per minute. The chemical is contained in a vat on the movable track frame at a position where it receives drainings from the near end of cleaned joints.

The tubular inside-cleaning machine at the Oklahoma City warehouse has been operated satisfactorily for several months. When operation of the machine was observed for the preparation of this article, 2½-in. upset Range 2 tubing, averaging 30 ft. to the joint, was being cleaned. The machine was cleaning this tubing at the rate of 4 ft. per second, making a trip each way through the joint at the rate of 1 minute and 4 seconds per trip. Experience shows that normally an average of approximately 160 joints are cleaned in an 8-hour day. Cost of cleaning has been estimated to be 1¼ cents per foot for 2-in. and 2½-in. tubing.

Cleaning Sucker Rods

For cleaning sucker rods, special equipment has been developed for applying chemical and steam mixed in the same proportions as for the tubular inside-cleaning machine. In the cleaning of sucker rods, the chemical used is Magnus. Sucker rods are moved through the process by chain conveyor operating on sprocket wheels.

The rods first enter an enclosed chamber fabricated from a 50-gal. drum containing a steam-and-chemical mixture. Next it passes through a cylinder made from a 4-ft. nipple of 12-in. pipe where paraffin and oil are removed from the rod. Following this, the rod goes through a cylinder of the same size into which white steam is injected to remove the chemical and avoid corrosion.

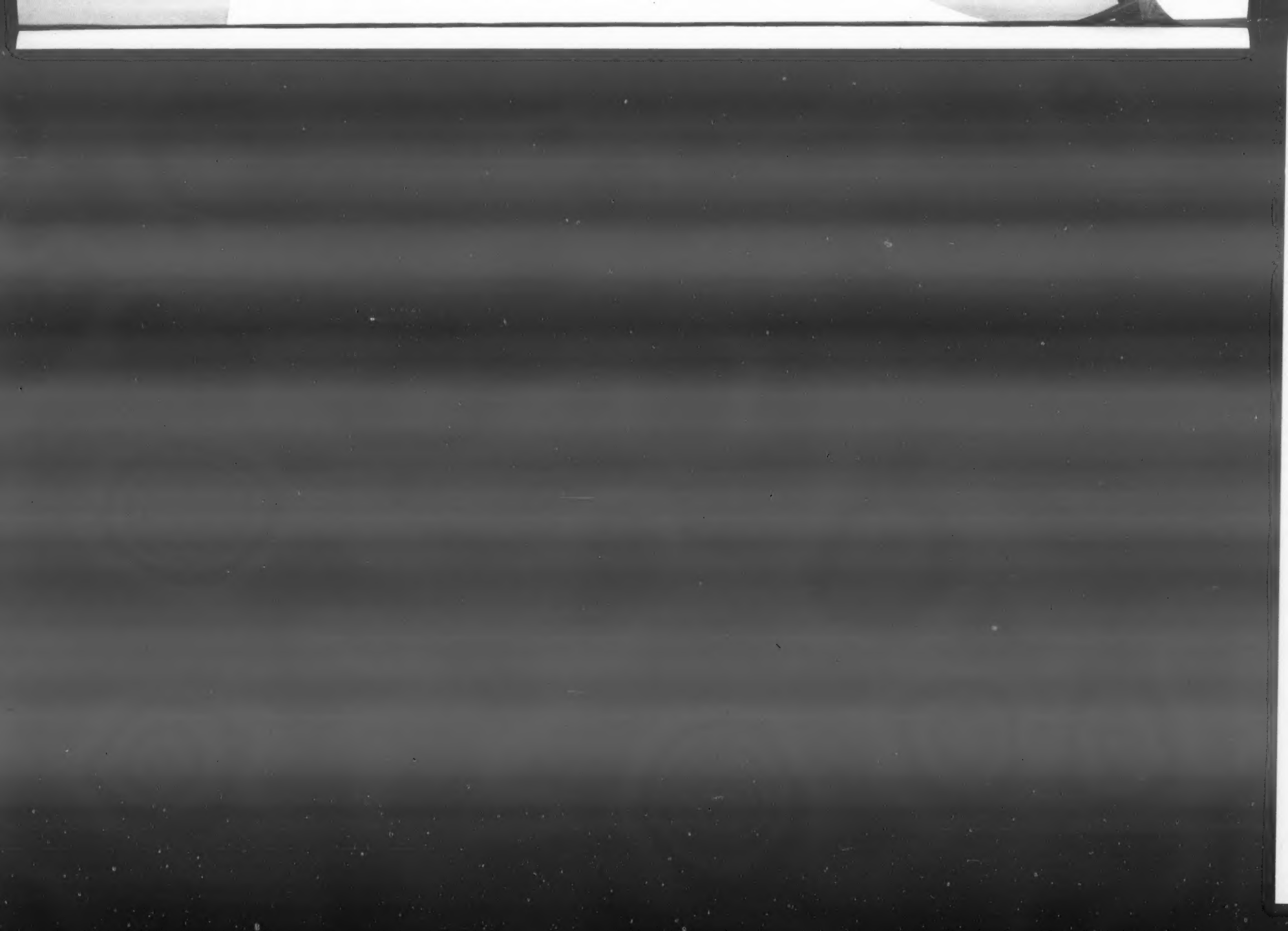
The chain conveyor, operated by a 1-hp. electric motor, has two sets of fingers 25 ft. apart. The sucker-rod pin is dropped between these fingers, which pull the rod through the processing operations. For operating this equipment three men are engaged. One of these screws rods together for the short strings handled by the conveyor. The other two men inspect rods leaving the process, break the rods and roll individual joints to the cleaned-rod rack.

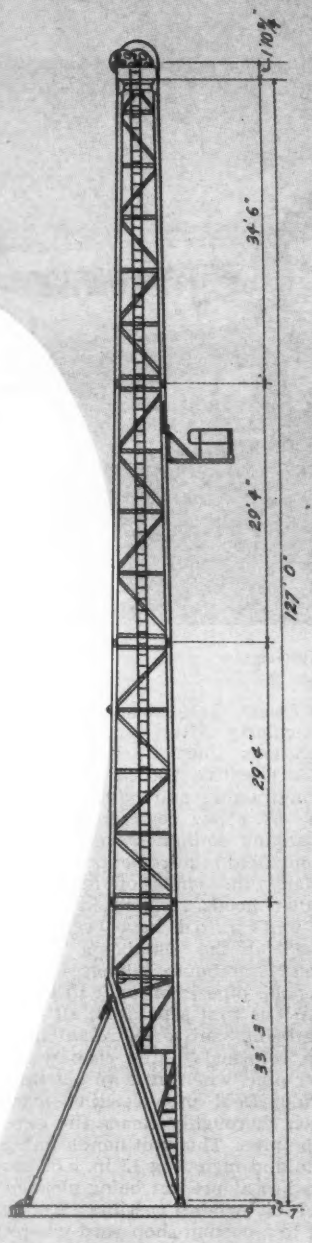
Speed of Travel

Rods travel on the conveyor chain at the rate of 1 ft. in 2 seconds, regardless of the size of the rod being cleaned. Average cost of cleaning sucker rods is ¾ cents per foot including labor, chemical, steam, and the replacement of boxes.

This same unit is also used to clean Reda cable of the accumulations of oil and salt resulting from submergence in fluid in wells prior to the cable being put through a vat containing a rust inhibitor. These cables are unreeled from one spool, passed through the cleaning machine and the dipping vat, and spooled onto another reel, at a very low cost per foot.

In the salvage shop gate valves and fittings are reconditioned by methods devised for conducting these operations with high efficiency. The first step is thorough cleaning and inspection. If valves and fittings are oily or greasy, they are boiled in a vat containing Oakite; if rusty, corroded, or dirty, they are sandblasted. After cleaning, dismantling is done by a





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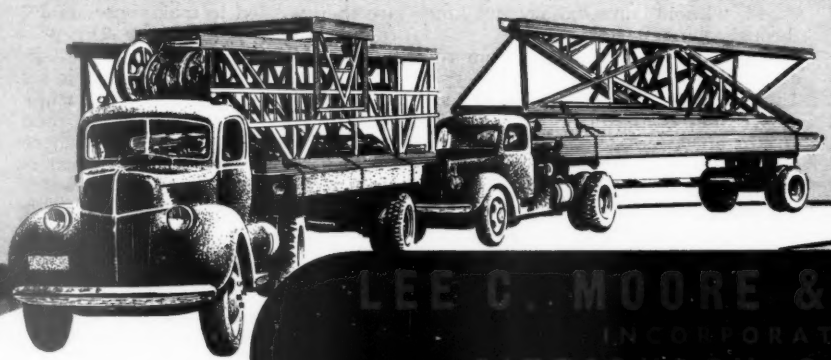

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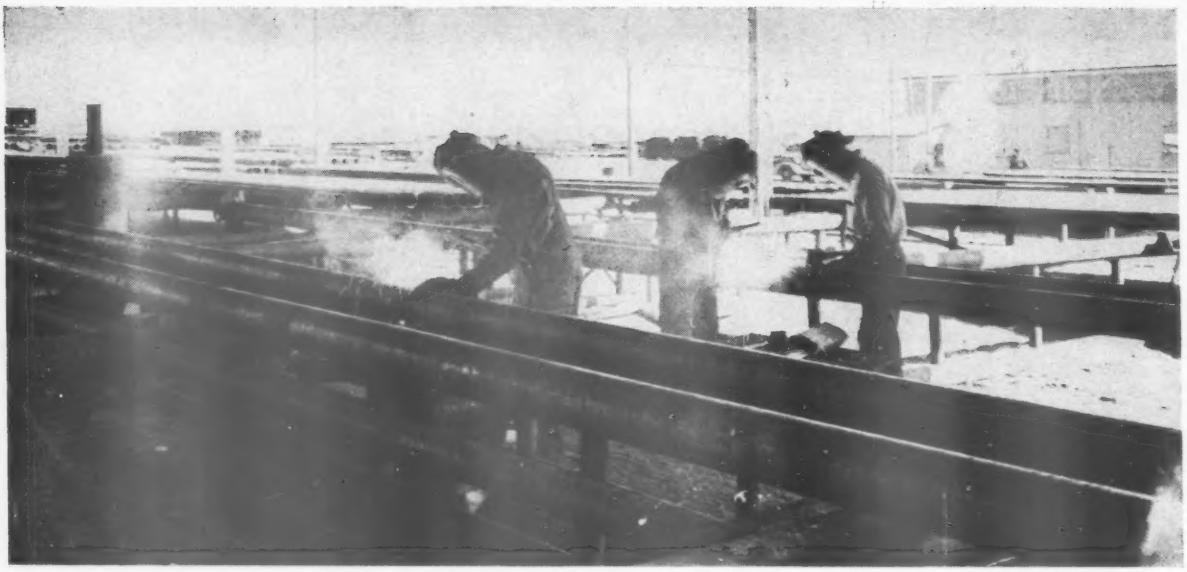

Double jointing of pipe to facilitate laying wet-gas gathering systems

Chicago Pneumatic impact wrench which accomplishes within a few minutes work which usually consumes much time.

Disks are reground by the use of coarse emery cloth which has been glued to an aluminum disk. Grinding of disks is done by equipment which includes a 2-hp. electric motor and a salvaged automobile transmission. A steel shield is placed over the disk. The equipment is served by an exhaust pipe and a reversed blower which removes dust by suction. Valves are seated by means of equipment consisting of an ordinary electric drill with shank to fit over the nut which is fixed to the seat grinder. After the valve has been reconditioned, it is repacked and assembled. The valve is tested at the pressure recommended by the manufacturer. Flanged end valves are tested with a hydraulic press; screwed valves are tested on screwed connections. Cost, including complete repairs in the reconditioning of valves, is approximately $1.00 per diameter inch for flanged-end gate valves; for screw-end gate valves it is 75 cents per diameter inch.

For grinding ground-joint unions, a cast-iron bushing is fixed to the shaft of a grinder; this bushing is of a size suitable for the union being reconditioned. The operator screws half of the union to the cast-iron bushing and applies valve-grinding compound. While this is being turned by a shaft, he holds the other half of the union in place against it with his hands. The cost of grinding unions is estimated at 25 cents per diameter inch. The grinding equipment has been built so that an operator may grind a gate valve on one end of the shaft driven by a 2-hp. motor while another operator may grind a union simultaneously at the other end of the shaft.

Plates of dismantled bolted tanks are cleaned in a 10 by 10-ft. vat containing Oakite heated by steam, into which plates are lowered by an electric chain hoist. After oil and b.s. have been removed, the hoist takes the plates out of the vat for rinsing and inspection. A primer base paint is applied for preserving and for facilitating painting at a later time by the operating department with the color desired for service in the field. The average cost of cleaning tanks is 10 cents per barrel of capacity.

Handling of Fittings

Measures have been taken for the handling of fittings stored in the warehouse which have increased efficiency of operations for filling requisitions. Sets of bins for fittings are placed on either side of aisles in a conventional manner. The unusual feature of this warehouse consists of having each set of bins hold all of the various types of fittings of a single diameter. This means that when a requisition comes for fittings, for instance, for 4-in. lead lines to a tank battery, connections such as ells, tees, and bull plugs can be readily procured without unnecessary walking through the warehouse.

Bins have been cut back from the original box type to a tapered type. Therefore, the hazards of using ladders to get fittings from upper tiers of bins are avoided.

A method of keeping warehouse accounts has been adopted by the company which is practicable for operating requirements. When equipment is taken to a warehouse, the property from which it is removed is credited with the after-repairs-condition rated value of the item and is charged with an estimated cost of reconditioning.

Efficient warehouse operations are particularly vital for oil-producing operations since it is important to make effective use of labor so that reconditioning and handling may be done at a low cost in the program of making equipment readily available for field requirements.

Many thousands of feet of used tubular goods ranging in size from 2⅜ to 24 in. o.d. have been reconditioned at the Oklahoma City and Borger warehouse salvage yards.

As the pipe is brought in from the field it is first separated, all crooked pipe being sent to a straightener and then returned to the rack with the other pipe, where it is all put through a New Deal pipe-cleaning machine which thoroughly cleans the exterior of the pipe. This unit handles all pipe up to and including 13 in. o.d. Larger sizes are at present being cleaned by hand or, where possible, are being sent to a custom shop yard where the pipe is cleaned by shot blasting.

After being put through the cleaning machine, the pipe is then carefully graded according to condition, large-size threaded-and-coupled line pipe is plain-ended, and two joints are then welded to make one double-random-length joint of pipe. This procedure involves the use of a shop-made jig, which aligns the two joints and holds them rigidly in place while the tack weld is made. The pipe then passes to the second station where the second weld with 5/16-in. rod is made, and then on to the third welding station where the last weld with 3/16-in. electrode is made. The welding of these short pieces into long double joints has greatly expedited the laying of this pipe in wet-gas-gathering systems, and also has materially reduced the cost of field welding.

QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Viscosity at Pipe Line Temperature

In the issue of January 5, A. J. F. asked about the viscosity of crude oils and the temperatures in oil lines. The answer is completed in this issue.

The viscosities of Oklahoma, Kansas, Illinois and Wyoming crude oils were shown in the issue of January 5. Similar data are presented here on Texas and California oils in Figs. 5 and 6. The California oils have much the same viscosity-temperature slope as the so-called standard Oklahoma crude oils, but the viscosity of the Texas oils shown here (except Item 2) changes rapidly with temperature.

Pipe-Line Temperatures

Estimates of pipe-line temperatures are confused by so many variable conditions and so many variable purposes of the operators that only approximate predictions can be made. The length of the line, variations in depth, wetness and characteristics of the soil, unusual weather conditions, etc., all contribute to the complexity of the situation.

During the five coldest months of November through March, average pipe line temperatures are about 10° above the average weather temperature for January. Average pumping rates throughout these five winter months can be judged on this basis. Table 1 shows average weather throughout January according to U. S. Weather Bureau statistics except that some attention was given to those parts of the state or area in which oil is handled. Thus, the somewhat uniform temperature in and around San Francisco was not given much weight because little oil is handled through this area. Likewise the high altitudes encountered in some areas of California cause a big range in conditions.

Occasional blizzards are also of some significance. The severity of these as judged by the lowness of temperature attained and their duration, results in minimum line temperatures and a very low capacity for a few days or a week. If capacity must be had at all times, the minimum line temperatures shown in Table 1 must be considered. Very few crude oils can be handled at temperatures below 30° either because of wax or because of the enormous increase in viscosity which occurs with even wax-free oils, and hence not much of a practical nature can be done about the extremely low temperatures occasionally encountered in almost all areas of the United States.

The somewhat large ranges shown under each heading in Table 1 are due to normal changes in climate for that area but they are also due to the wide variation in altitude and the wide extent of some states such as Texas. The design figures are meant to represent the worst conditions that should be encountered with adverse weather, poorly buried or wet lines, or high altitudes.

Martin and Heltzel presented some pipe-line temperatures in "Temperature Observations for One Year Streams of Petroleum Flowing in Mid-Continent Oil Pipe Lines," before the October 6-8, 1930 meeting of the American Society of Mechanical Engineers at Tulsa.

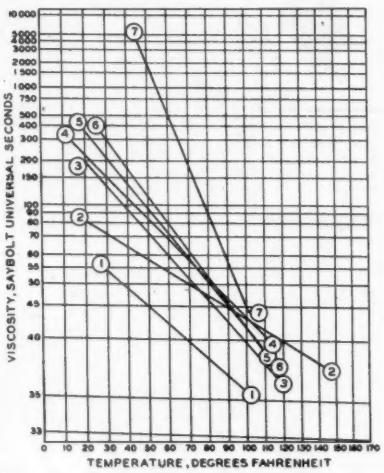

Fig. 5—Texas crude oils

	A.P.I.
1. North Texas	39.0
2. Mentone	37.8
3. East Texas	40.1
4. West Texas	33.0
5. Pampa	...
6. Gray County	41.9
7. Panhandle	...

TABLE 1

	Weather Temp., °F.		Design, pipe-line temp., °F.	
	January	Minimum	5 Cold months	Minimum
Arkansas, Little Rock	41	—12		
Approx. range	33-43	—8 to —18	40-50	30-40
California, Los Angeles	55	28		
San Francisco	50	27		
Approx. range	30-55	13 to 28	45-60	40-50
Illinois, E. St. Louis	31	—22		
Chicago	24	—23		
Approx. range	20-35	—21 to —25	30-40	20-30
Kansas, Kansas City	28	—22		
Wichita	31	—22		
Approx. range	23-35	—22 to —31	30-40	15-30
Louisiana, N. Orleans	54	7		
Approx. range	40-55	2 to —5	45-60	35-50
Missouri, Kansas City	38	—22		
St. Louis	31	—22		
Approx. range	25-35	—22 to —25	30-40	20-30
Montana, Billings	....	—49		
Approx. range	10-20	—42 to —50	20-30	5-20
New Mexico, Santa Fe	29	—13		
Approx. range	23-35	—8 to —13	30-40	20-30
Oklahoma, Okla. City	36	—17		
Approx. range	25-40	—3 to —27	35-45	20-30
Pennsylvania, Pittsb'gh.	31	—20		
Philadelphia	33	—11		
Approx. range	25-35	—20 to —27	30-45	20-35
Texas, Dallas	45	—10		
San Antonio	52	4		
Galveston	54	8		
Approx. range	30-55	12 to —10	45-60	30-50
Wyoming, Casper	....	—30		
Approx. range	10-25	—30 to —38	20-35	5-25

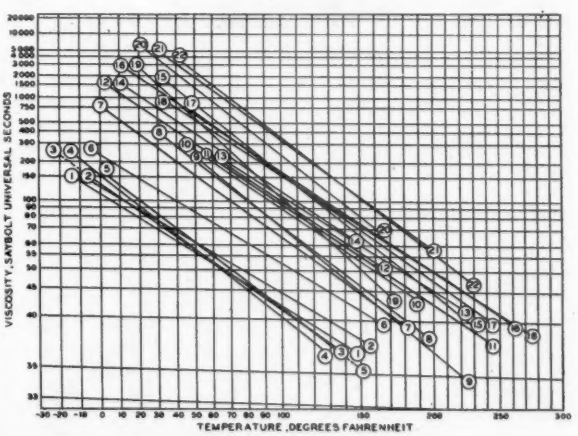

Fig. 6—California crude oils

	A.P.I.		A.P.I.
1. Kettleman Hills	35.3	12. Kraemer	26.1
2. Kettleman Hills	32.0	13. Venice	24.1
3. Santa Fe Springs	34.7	14. Torrance	24.6
4. Santa Fe Springs	35.0	15. Fruitvale	23.5
5. Santa Fe Springs	34.1	16. Huntington Beach	25.9
6. Puente	29.5	17. Baldwin Hills	21.6
7. Ventura	30.0	18. South Mountain	24.0
8. Ventura	28.3	19. Huntington Beach	23.2
9. Mountain View	28.1	20. Whittier	20.0
10. Signal Hill	26.8	21. Signal Hill	21.5
11. Seal Beach	26.7	22. Montebello	20.0

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Investment, Present Value And Payout for Uniform Rates of Production

*by Park J. Jones**

PART 20 OF A SERIES

OPTIMUM rates of production vary with producing rates. A portion of a reserve is usually recoverable before the rate of production from a reservoir starts declining. The ratio of the reserve recoverable before production starts declining to the ultimate recovery from a reservoir varies with the initial well producing capacity, the decline of well producing and with the rate of production itself. Producing and operating methods determine the investment required in order to maintain a fixed rate of production from a reservoir for a desired number of years. The present value of the reserve recoverable at uniform rates depends on the income after taxes, royalty and operating expenses less investment. Investments are determined by the ratio of the well producing capacity for a reservoir to per-well investment. Payout of investments depends on the product which results when operating income is multiplied by the ratio of per-well annual producing capacity to per-well investment. The foregoing considerations are illustrated graphically and by examples.

*Production consultant, Houston.

The Investment

LET I denote the per-well investment in M.c.f.'s, or barrels, per well. Denote the average daily per-well rate of production by Q_w. The per-well annual producing rate is $365Q_w$. Let X be defined by:

$$X = 365Q_w/I$$

where X is the ratio of per-well annual producing rate to per-well investment.

Let Q equal an annual rate of production from a reservoir. Then the number of wells W required to produce at the rate Q is given by:

$$W = \frac{Q}{365Q_w} = \frac{Q}{IX}$$

and the total investment IW is defined by:

$$IW = \frac{Q}{X} \qquad (1)$$

Present Value of Cumulative Recovery

The cumulative recovery at any time n for a uniform rate of production Q is equal to Qn. The straight lines in Fig. 20-1 are illustrative examples. Cumulative recovery in per cent of the reserve recoverable at uniform rates of production is plotted against time in years for uniform rates of production ranging from 3 up to 25 per cent of initial reserve.

The present value P_c before investment, taxes, royalty and operating expenses of the production accumulated at uniform rates, see the appendix to this article, is defined by:

$$P_c = \frac{Q}{i}(1 - e^{-in}) \qquad (2)$$

where n is time in years and equal to any value between zero and 1/Q. The symbol i represents the rate of interest. The curves below the straight lines in Fig. 20-1 are solutions of Equation 2. Present value in per cent of the reserve recoverable at uniform rates of production is plotted against time in years. The data are for a 3 per cent interest rate.

The Economic Balance

The sum of taxes, royalty and operating expenses is the burden on production or operating outgo. Let B denote the burden on production in M.c.f.'s per M.c.f., or barrels per barrel, of gross production. Then (1 — B) is the income per unit of gross production. The present value P after operating outgo but before development cost, investment, is defined by:

$$P = \frac{Q}{i}(1 - e^{-in})(1 - B) \qquad (3)$$

The cost of development, see Equation 1, is Q/X. Compressor plants, natural-gasoline plants, water plants and cycling plants are necessary producing facilities. The investment in a plant divided by the number of producing wells associated with, or served by, a plant is equal to the per-well plant investment. The per-well investment I includes per-well plant investment. The total investment Q/X includes plant investment. So the present value P after operating outgo and investment is defined by:

$$P = \frac{Q}{i}(1 - e^{-in})(1 - B) - \frac{Q}{X} \qquad (4)$$

The conditions found in the field

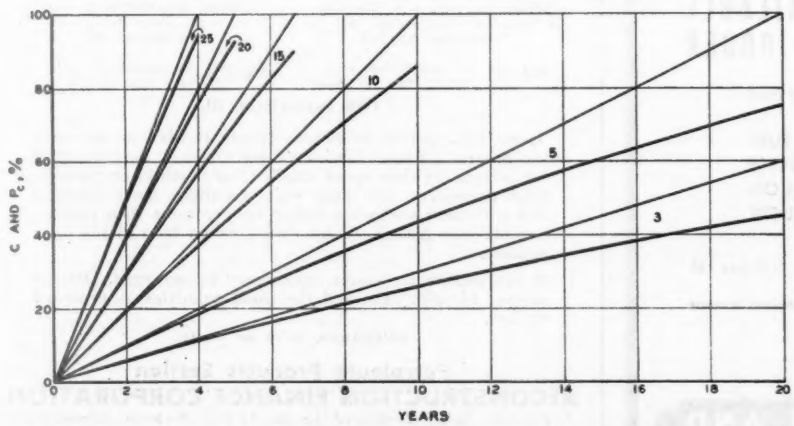
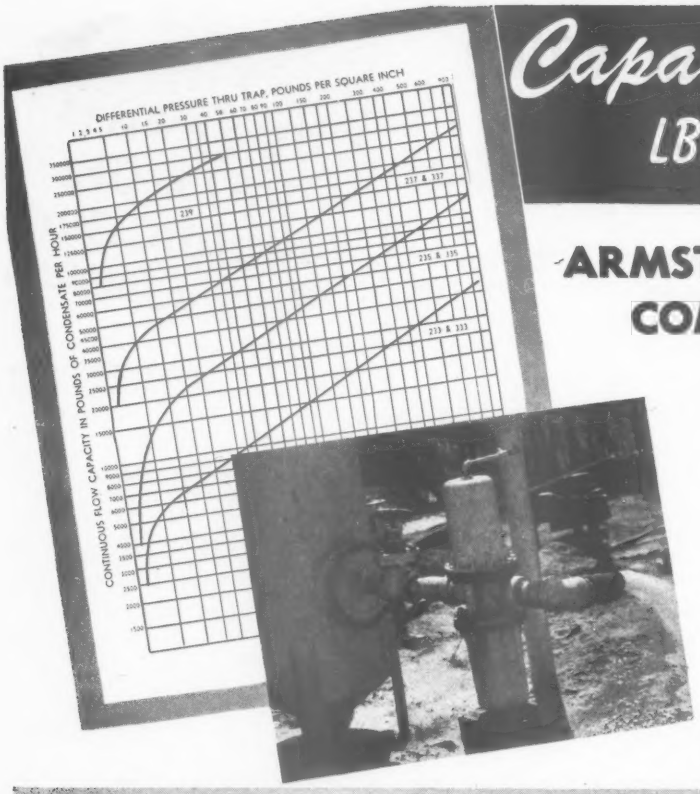


Fig. 20-1—Present value in per cent of the reserve recoverable at uniform rates of production vs. time in years; straight lines show cumulative recovery; curves show present value. Present value is before investment, taxes, royalty and operating expenses. Interest is 3 per cent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as to investments and operating outgo vary widely. In order to apply one set of curves to the conditions found in practice, Equation 4 may be written as follows:

$$\frac{P + Q/X}{1 - B} = \frac{Q}{i}(1 - e^{-in}) \quad (5)$$

The left side of Equation 5 is the same as the left side of Equation 2. Hence, curves like those shown in Fig. 20-1 may be applied to obtain present value after operating outgo and investment. A graph value times (1 — B) is present value after operating burden. And present value after operating burden less investment, Q/X, is present value after operating outgo and investment.

A Natural-Gas Reservoir

The initial reserve of a natural-gas reservoir, is 1 trillion cubic feet. Sixty per cent of this reserve or 600 billion feet is recoverable in 10 years at a uniform annual rate. The per-well investment is 2 billion feet. The per-well producing capacity at the end of 10 years is estimated at 5.5 million feet per day. Operating outgo is estimated at 30 per cent of gross production. Peak demand during winter months is estimated at 22 per cent above the average demand. Estimate the present value of the 600-billion-foot reserve at the end of 2, 4 and 6 years if all of the wells to be required by the end of the tenth year are drilled during the initial development program.

Solution.—In this example, the per-well producing rate relative to the peak demand is 5.5/1.22 or 4.5 million feet per day. The ratio X of annual per-well producing rate to per-well investment is 4.5 (365)/2,000,000,000 or 0.822. The initial rate of production is 10 per cent or 0.1. The total investment is Q/X or 0.1/0.82 or 12.16 per cent of 600 billion feet or 72.96 billion feet. The required number of wells is 37. Present values for 37 wells, which is a 74-billion-foot 12.3 per cent investment, may be itemized as follows:

End of year—	2	4	6
Present value, per cent ..	19.3	37.6	55.0
After operating outgo, per cent	13.5	26.3	38.5
After operating outgo and investment, per cent ...	1.2	14.0	26.2
Present value, billion feet	7.2	84.0	157.2

The values in the second line are obtained from the 10 per cent rate of production curve in Fig. 20-1. The third line is 70 per cent of the second line. The fourth line is the third line less the 12.3 per cent investment. The last line is the fourth line multiplied by 600 billion feet.

Payout for Uniform Rates of Production

The payout in terms of a uniform rate of production may be obtained from Equation 4. At payout the present value defined by Equation 4 is equal to zero. The payout n for zero interest rate is defined by:

$$n = \frac{1}{X(1 - B)} \quad (6)$$

The payout in the example on the gas reservoir just considered would be 1/0.822 (0.7) or 1 year and 9 months if interest were zero and aside from the period of development.

The payout for interest rates other than zero is given by:

$$X(1 - B) = \frac{i}{1 - e^{-in}} \quad (7)$$

The expression $i/1 - e^{-in}$, or its equivalent $ie^{in}/e^{in} - 1$), is called the capital recovery factor. The 3 per cent curve in Fig. 20-2 is a solution of Equation 7. The zero-interest-rate curve is a solution of Equation 6. Payout in years for uniform rates of production is plotted against the product of investment X and income (1 — B).

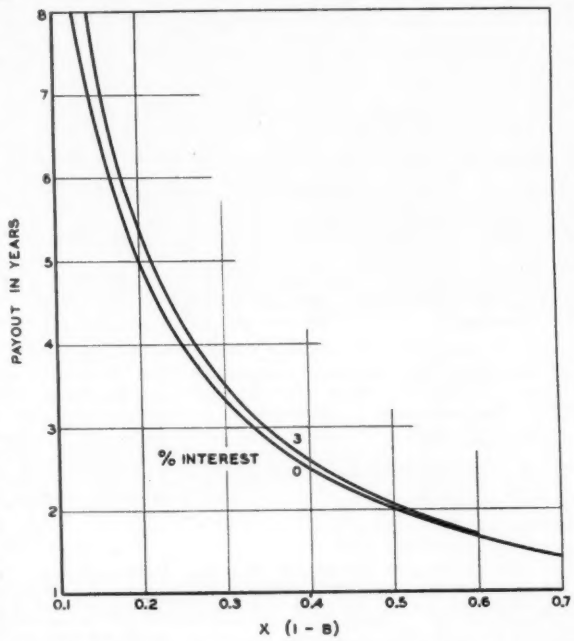


Fig. 20-2—Payout vs. X(1 — B) and interest rate for uniform rates of production; X is ratio of per well annual rate of production to per well investment in M.c.f.'s per M.c.f., or barrels per barrel, of gross production

End-of-Year Payments

The capital recovery factor for uniform end-of-year payments is defined by:

$$\text{Capital recovery factor} = \frac{i(1 + i)^n}{(1 + i)^n - 1}$$

This capital recovery factor times an investment gives the uniform end-of-year required to repay an investment in n years with interest. For example, to payout a million dollars in 5 years, the required uniform annual income after taxes, royalty, and operating expenses is $218,350 per year if interest is 3 per cent and compounded annually. The lines in Fig. 20-3 give the payout for uniform annual incomes. Uniform annual income after operating outgo in per cent of investment is plotted against interest rates and payouts ranging from 2 years up to 10 years. We might note that payouts for annual compounding of interest are slightly higher than for continuous compounding of interest.

Relative Investment

The investment required in order to produce at a uniform rate of desired number of years depends on the initial well producing capacity, the decline of well producing capacity and on the rate of production. The decline of well producing capacity de-

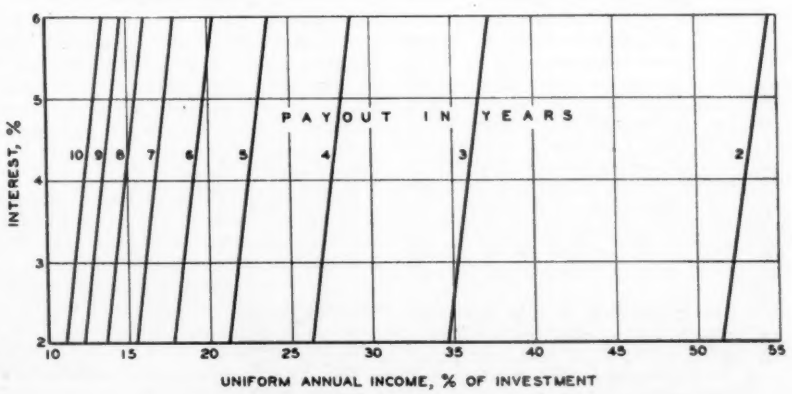


Fig. 20-3—End-of-year payout vs. uniform annual income and interest

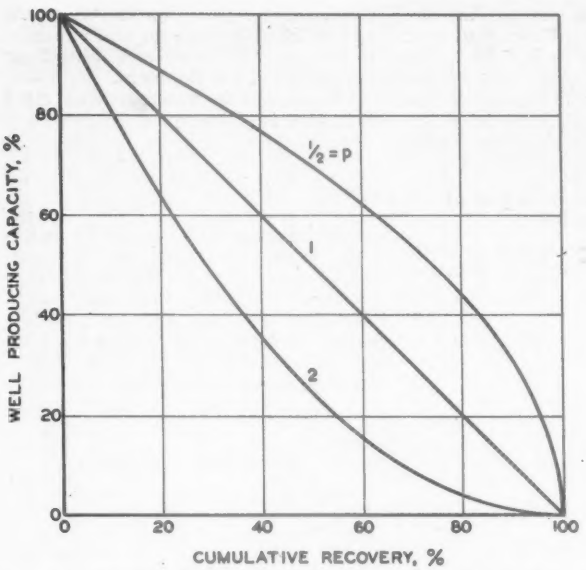


Fig. 20-4—Well-producing capacity in per cent of initial well-producing capacity vs. cumulative recovery and exponent p

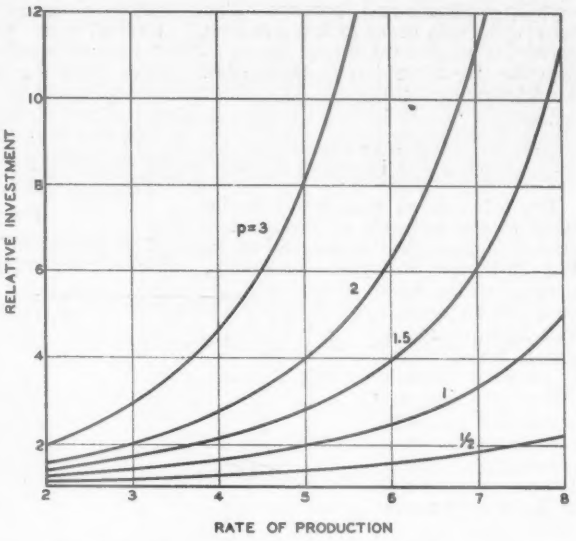


Fig. 20-5—Relative investment required to maintain a uniform rate of production for ten years vs. rate of production and exponent p: rate of production in per cent per year of an initial reserve

pends on producing and operating methods. The data in Fig. 20-4 are illustrative examples, for which:

$$V = V_o (1 - C)^p \qquad (8)$$

where (1 — C) is the reserve at any time; V_o, the initial well producing capacity; V, the well producing capacity at any time. The exponent p depends on producing and operating methods.

If there were no decline in well producing capacity, the initial investment for wells producing at capacity would be V_o/X and for wells produced at some fraction of their capacity, by Q/X. The relative investment is V_o/Q. For example, if wells are produced at, or have an allowable equal to, 20 per cent of their capacity, the relative investment is 1/0.2 or five.

On the other hand, the relative investment resulting from decline of well producing capacity is defined by:

$$\frac{V_o}{Q} = \frac{1}{(1 - Qn)^p} \qquad (9)$$

where (1 — Qn) is the reserve at any time n for a uniform rate of production. The curves in Fig. 20-5 are solutions of Equation 9. Relative investment is plotted against uniform rates of production. Fourfold to twelvefold increase of investment is for reservoirs from which oil is produced by evolved solution gas. A decline of well producing capacity down to 10 per cent of its initial value would require a tenfold increase of investment if the rate of production were to be maintained at a rate equal to the initial well producing capacity. On the other hand, if reservoir pressure is maintained, the relative investment is less than four, see the curve denoted by (1) in Fig. 20-5. Maintenance of pressure is more profitable, as a rule, than the drilling of a comparatively large number of producing wells.

Appendix to Article 20

The present value of production is given by Qe^{-in} where Q is a rate of production at any time n and e^{-in} is the present worth factor for the interest rate i. The present value P_c of the recovery accumulated over n years is given by:

$$P_c = Q \int_0^n e^{-in}\, dn$$

which, when integrated, gives Equation 2.

B. of M. Reports on Hazards Of Hydrogen Sulfide

Methods used successfully in combating hazards of hydrogen sulfide poisoning in the Elk Basin oil field of Wyoming and Montana can be adapted to nearly every oil field in which gas with a high content of hydrogen sulfide is produced with the oil, the Bureau of Mines reports in a new publication which again calls attention to the dangers of hydrogen sulfide poisoning in the petroleum industry.

As a result of precautionary measures in disposing of hydrogen sulfide gas by companies operating in the Elk Basin oil field, not a single serious injury or a fatality from hydrogen sulfide poisoning has occurred in more than 2 years, the Bureau report pointed out.

The hydrogen sulfide-bearing petroleum in the Elk Basin field comes from the deeper formation, known as the Tensleep sandstone. Samples of the gas liberated by this oil showed a concentration of hydrogen sulfide gas ranging from 6 to 18 per cent by volume, and in field operations the oil must be handled with every precaution if serious injury and possible fatalities are to be avoided.

Since hydrogen sulfide burns readily, companies operating in the Elk Basin oil field have used this means of disposing of the noxious gas. Oil from all the wells on each lease first is taken through an oil and gas separator, which removes most of the gas, after which the oil passes to a battery of 500-bbl. steel tanks. The gases are conducted a safe distance from the tanks and burned from a vertical pipe. Before burning the escaping gas, precautions are taken by installing safety screens to prevent a possible flash-back explosion to the battery of tanks or the oil and gas separator.

The Bureau report points out that construction details for each battery of tanks are not standardized, but nevertheless follow the same general pattern.

In reviewing some of the literature on hydrogen sulfide poisoning, John H. East, Jr., mining engineer, and Ralph H. Espach, petroleum engineer, authors of the Elk Basin report, listed and emphasized a number of general recommendations for the prevention of hydrogen sulfide poisoning in the oil fields.

A copy of the publication, Information Circular 7334, "Method of Handling Hydrogen Sulfide Gas in the Elk Basin Oil Field of Wyoming," by J. H. East, Jr., and Ralph H. Espach, may be obtained free from the Bureau of Mines, Department of the Interior, Washington 25, D. C.

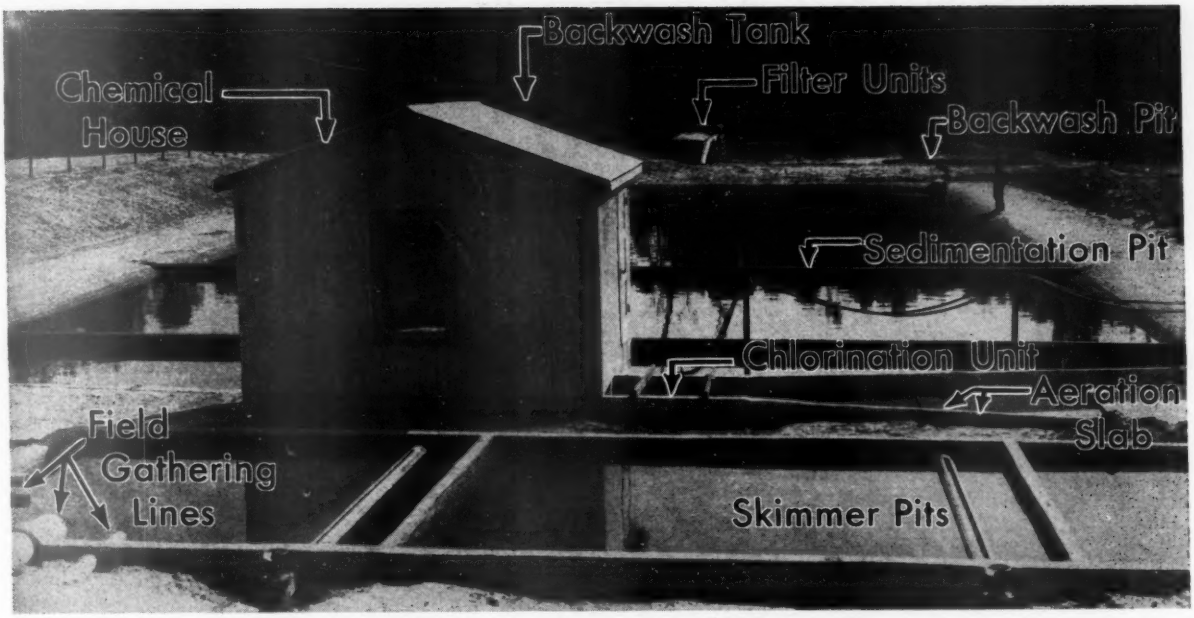
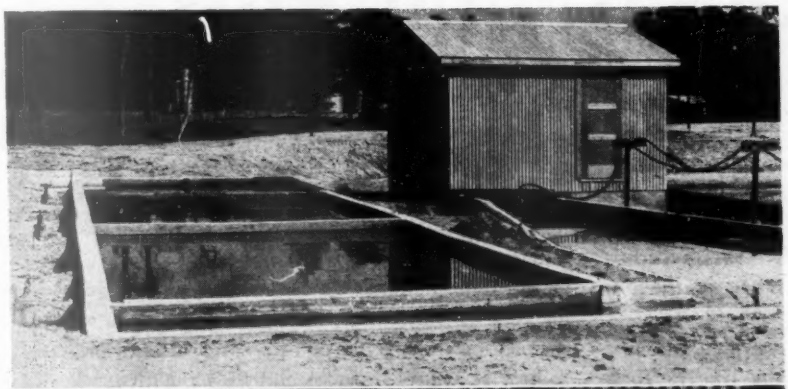
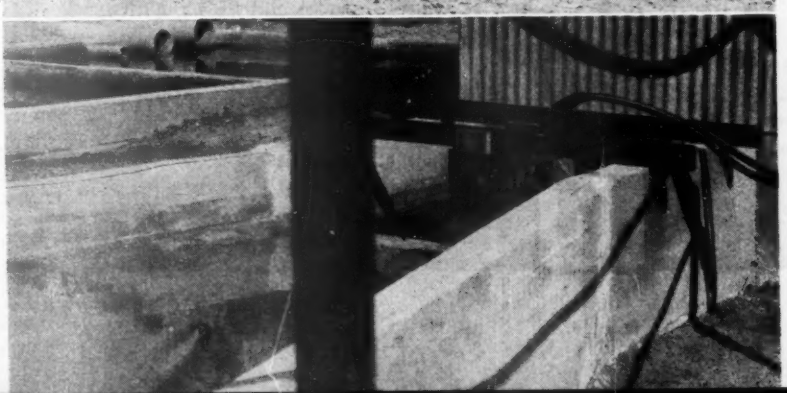


Fig. 1—General view of the Cockfield salt-water-disposal plant in the Conroe field, Montgomery County, Texas. This is an open-system-type plant. Sedimentation pit is constructed by Gunite method of concrete placement. Housed generating equipment for chlorinator (not shown) is opposite chemical house to the right. East Texas Salt Water Co. cooperated in the design of this plant

Latest Improvements Incorporated Into Conroe Salt-Water Disposal Plant

by E. H. Short, Jr.





A SALT - WATER - DISPOSAL system has just been completed in the Conroe field, Montgomery County, Texas, which utilizes in its design all of the most recently proven engineering practices pertaining to the disposal of salt water.

This plant was installed by the Cockfield Co. The operators in this organization are: G. W. Strake, Houston Oil Co., The Texas Co. and Tide Water Associated Oil Co. In the Conroe field these four companies have a total of 173 oil-water wells which

Fig. 2 — (Upper) Closeup of skimmer and aeration slab. Skimmer is 58 ft. long and 15 ft. wide. Water enters skimmer in compartment at far end. Water goes under baffle and over another in first compartment, then flows into second and third compartments. Water emerges from fourth small compartment onto aerating slab at right. Flow of water over slab will not be in excess of ½ in. in depth. Oxidizable material not oxidized by air as water flows over slab will be oxidized by the chlorination unit

Fig. 3—(Lower) Five-plate electrode chlorinating unit in pit at right

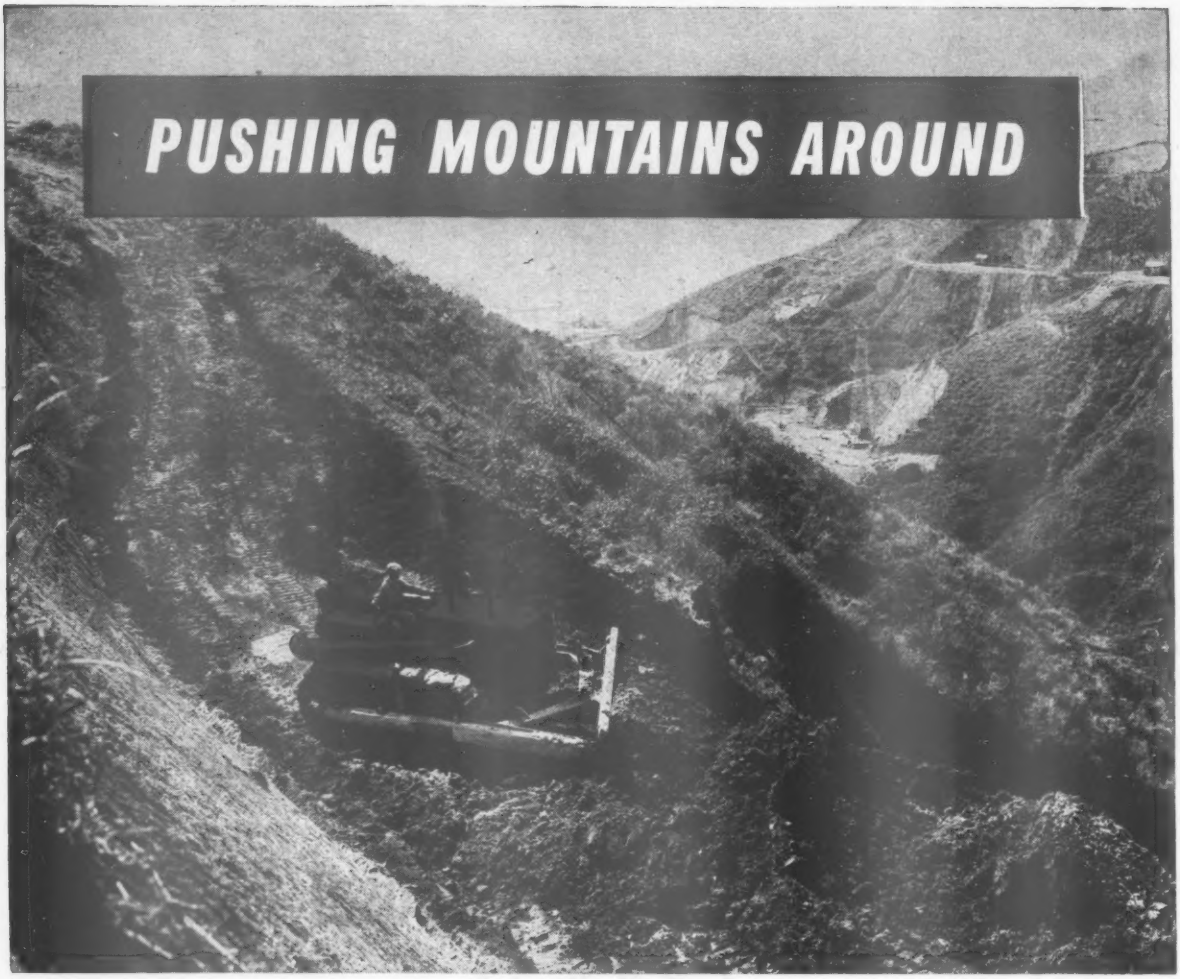


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Fig. 4—(Right) Elgin filters, injection, and backwash pumps. Water comes in top of filters and passes through series of gravel layers. Gravel ranges in size from ⅛ to ½ in. Filtered water leaves filters through spreaders in bottom of tank. Use of spreaders keeps water from channeling

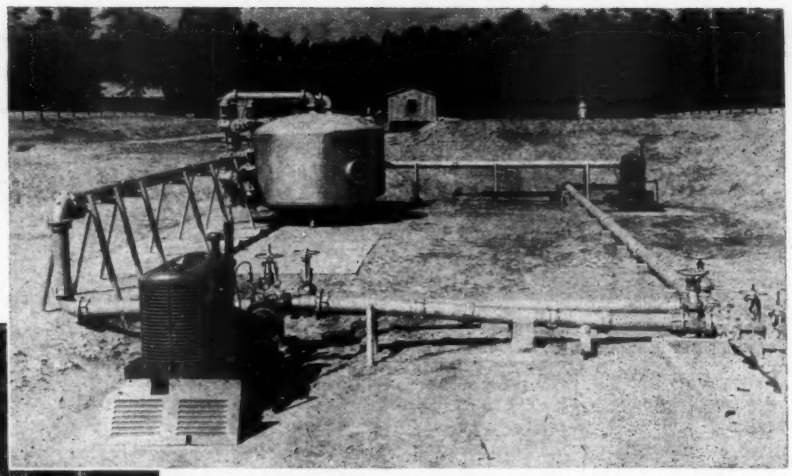


Fig. 5—(Below) Elevated creek crossings to maintain continuous downward grade in gathering lines

produce approximately 5,745 bbl. of salt water daily.

The Cockfield salt-water plant is an open system and handles water from 25 tank batteries. In this type of system salt water is collected at the plant, exposed to the air, treated, and then injected into a disposal well. Essentially the system is a series of concrete pits. In the first step the salt water from the field gathering lines is discharged into oil skimmer pits which removes any small amount of oil which escaped separation at the central tank batteries. The salt water is then allowed to flow over an aerating table, where oxidation takes place (mostly iron oxide). The water is then collected into a smaller pit where it is chlorinated for bacteria. Chlorine is generated from the salt water by passing a direct current through the water from carbon plates. If further treatment is required, such as the use of alum or lime, it may be done in the same pit.

Capacity of Settling Pits

The water then flows to the large settling pits with a retention time of approximately 24 hours. The capacity of the settling pits is 15,000 bbl. for 24 hours. Of course, if the retention time should be 12 hours the capacity would be 30,000 bbl.

From the settling pits the water passes through pressure filters, then into the clear tank, thence through a meter into the disposal well.

The gathering system for this project covers a rather large area, as shown in Fig. 1. Lines running north from the disposal plant to the Houston Oil Co. and Tide Water batteries in the north part of the field cover a distance of 16,000 ft. The portion of the system running northeast to The Texas Co.'s tank battery cover a distance of 20,000 ft. Cement-asbestos lines varying in diameter from 2 to 12 in. are used in this system.

Of particular interest in connection with the Cockfield gathering system is the fact that all gravity lines have a continuous downward grade to the disposal plant. This prevents gas locking and eliminates the installation of

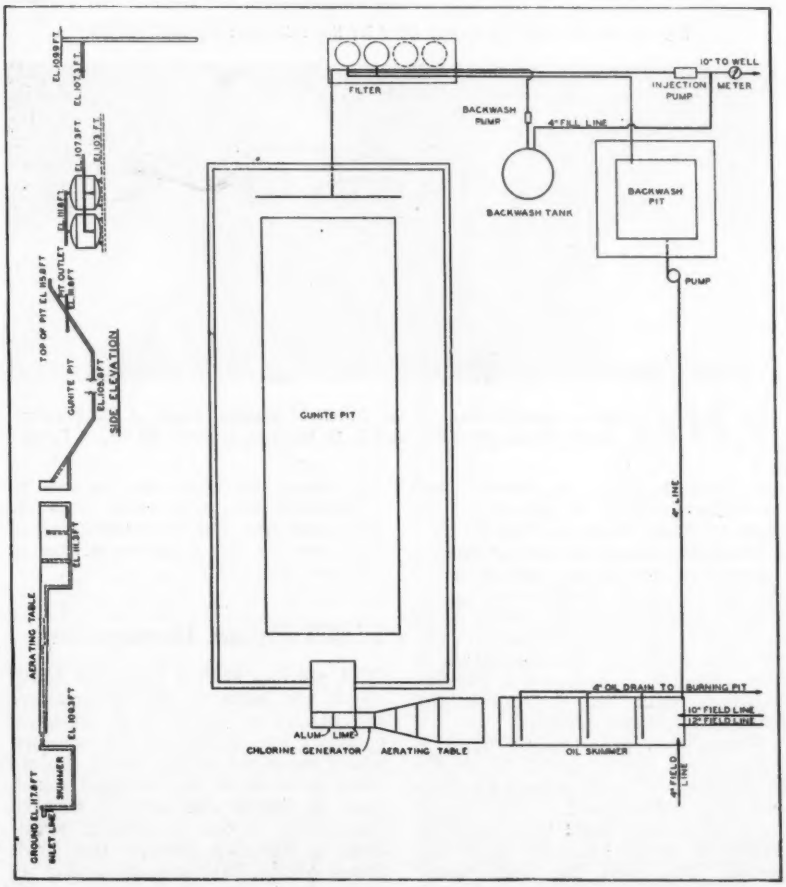


Fig. 6—(Right) Flow sheet of Cockfield company Conroe salt-water-disposal system

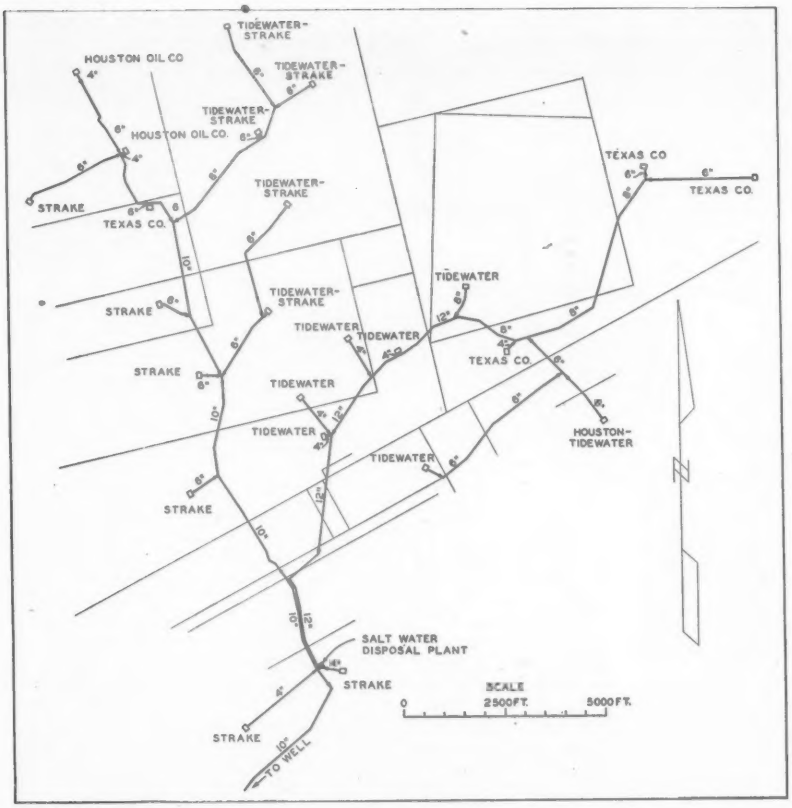


Fig. 7—Sketch showing survey lines for the salt-water-disposal system

Fig. 8—B. Y. Jackson, superintendent of the Cockfield disposal plant; A. L. Koehler and F. A. Gayle, Gayle Construction Co., and G. H. Hartung, Houston Oil Co. of Texas

the large number of vents which would have had to be installed in the lines to make them trouble free.

Another feature of this salt-water-disposal project is the use of an oil skimmer at each tank battery as an added precaution to the escape of oil to the gravity lines; thereby preventing extra trouble at the disposal plant. This skimmer consists of a 100-bbl. redwood tank 12 ft. in height, equipped with a siphon.

Water from the disposal plant is injected into one of the G. W. Strake wells acquired by Cockfield Co. This well was recompleted in the top of the main Conroe sand with approximately 75 ft. of sand for water injection. This well has been tested by taking salt water at the rate of 10,000 bbl. per day under vacuum. The sand face can be backwashed at any time by the injection of gas at 600 psi.

15,000 Flying Horsepower

JET engines with a thrust of 15,000 lb. per engine at speeds far above 375 m.p.h., at which 1 lb. of thust equals 1 hp., is one of the concepts which come out of the welter of data being released to the technical world. Such an engine can possibly soon be built, says Lovell Lawrence, president of Reaction Motors, Inc. Such power plants, Lawrence says, take up the load of driving aircraft where propeller-driven craft must give up. That is, the jet principle becomes efficient at around 450 m.p.h. and at 6-8 miles elevation, with engines delivering 3,000 hp. or more. Our most powerful American reciprocating engines with all the aids known are now turning up between 2,000 and 2,500 hp.

Lawrence recounts that, although we do not yet know the limits of engine speeds, velocities of 1,500 to 2,000 m.p.h are quite possible so far as the engine is concerned. The bottleneck in aircraft even now is in the design and shape of the ships flown instead of the power plant. Flying at 10 to 12 miles elevation will be practicable for jet engines because the forward motion of the engine helps to gather and compress the air needed for fuel combustion. The fuel generally is of the kerosene type.

In the realm of rockets, wherein the oxidizer as well as the fuel is contained in the projectile in toto, speeds of 6,000-7,000 ft. per second are practicable.

A G. E. super-jet engine has been installed in a B-24 bomber—same engine used in the Lockheed Shooting Star P-80—in the rear section just behind the aft bomb bay, exhausting through the tail. Using kerosene as fuel and equipped with a maze of instruments this ship will carry on flight research at high altitudes for the General Electric Co. collaborating with Pan American Airways. American Rocket Society allies with American Society of Mechanical Engineers to study jet propulsion.

Electronic "Analysis" Of Alloys

DETERMINATION of the constituents of an alloy quantitatively by means of an electronic device is the latest announcement in the electronics field. This device takes the form of a direct-reading spectrometer and a complete analysis of an alloy can be made in 40 seconds instead of several hours or even days in some cases by the older spectrographic methods. The machine is entirely automatic, it is claimed, from the time the sample of alloy is placed in the instrument until the results of the analysis appear recorded on paper. Its accuracy is reported to be equal or superior to that of the spectrograph used heretofore for this purpose.

As many as 14 elements may be determined simultaneously. The great advantage of the method is in industrial operations where the time lost while analytical results are sought will simplify and speed up plant operations in matters such as the melting and casting of alloys. Girls may be taught to operate the instrument accurately in a single day of training, it is claimed.

Kinematic Viscometer for Opaque And Very Viscous Liquids

by E. H. Zeitfuchs

The author has developed a viscometer satisfactory for determining viscosities of very viscous, opaque liquids, useful especially in the range of 1,000-75,000 centistokes. It consists of an enlarged bulb from which extend capillary tubes above and below, arranged as shown in the drawing and photograph. Ranges and dimensions of viscometers are given in Table 1, each instrument being limited to a relatively narrow viscosity range for improvement of accuracy.

E. H. Zeitfuchs, research engineer with the research subsidiary of Standard Oil Co. of California, has been associated for many years with the determination of physical properties and other fundamental data on petroleum products and has developed viscometers for various purposes for this work. Born in Portland, Ore., he graduated from University of California, attended Massachusetts Institute of Technology and Clark University. With the U. S. Bureau of Mines 1912-16, he joined the California Standard company in 1921; he is a member of several technical societies, including the Society of Automotive Engineers.

A CONSIDERABLE amount of study has been devoted to the development of an accurate and practical method for determining the viscosity of liquids that may be classed as very viscous, namely, in the range of about 1,000 to 75,000 centistokes. It has been desirable to determine the viscosity of both clear and opaque liquids in this range with the greatest accuracy possible, that is, without the necessity of applying correction factors that are troublesome and more or less uncertain.

The principal factor that has limited the use of the kinematic viscometers now generally employed in the petroleum industry for measurements in the above range is drainage, or hold up, of the viscous liquids on the inner surfaces of the glass. The purpose of the present study was to find means to reduce this effect to a minimum.

During the past 5 or 6 years, a number of different viscometers were designed and tried out in this connection. Of all of these, the design shown in Figs. 1 to 4 has proved to be satisfactory.

The unique feature in the design, by means of which drainage has been minimized, is the horizontal tubular reservoir 6, Figs. 1 and 2. This feature is a development of D. L. Houillon, in France, and was published in 1936[1]. A feature that is believed to be original in viscometer design is the siphon (4); its purpose is to make loading precise and as convenient as possible.

Kinematic viscometers for opaque liquids of the long-glass-capillary type have been described by Anderson, Wright, and Griffin[2], by Cannon and Fenske[3], and by Croxton[4]. Tests results in these viscometers indicate that drainage in the supply reservoir is an unfavorable factor in the case of very viscous liquid and therefore limits the accuracy of the results.

The Ubbelohde[5], S.I.L.[6], regular Fenske[7] and the Zeitfuchs[8] long-glass-capillary-type viscometers used in the petroleum industry are not well adapted for testing liquids that coat the inner surface of the glass with an opaque film and hide the graduation lines. These viscometers may be used for opaque liquids by reversing the normal direction of flow by means of additional auxiliary pressure or vacuum equipment, but this complication is a drawback in routine operation and when this method is applied to very viscous liquids the results are unfavorably limited in accuracy due to drainage.

The effect of drainage on the accuracy of the results can be reduced in all of the above published methods by limiting each viscometer to a relatively short range of viscosity or by the use of a reference chart showing the change in the viscometer constant with viscosity or flow time. Both of these procedures are unsatisfactory, particularly in control-laboratory service.

Operation of the viscometer.—Referring to Fig. 1, the viscometer is supported by its metal member, (13), on a leveled surface above the bath. Corks are inserted at (2) and (3) and the sample, about 1 ml., is introduced through (1) until the meniscus stands approximately at line (5). The cork at (3) is removed and the sample is allowed to flow into the horizontal tube (6). It is prevented from entering the capillary (11) by the siphon (4). After standing 2 or 3 minutes to come to the bath temperature, suction is applied at (3) to draw the sample over the siphon (4) and into the capillary (11). When the meniscus in the capillary reaches line (8), the cork at (2) is removed, excess liquid is drained into (7) and further flow into (6) is stopped. The passage of the meniscus between lines (9) and (10) is timed and the kinematic viscosity is calculated by Equation 5. The viscometer is cleaned while suspended in the bath with solvents introduced at (3) and (1) and by suction applied at (2).

Design of Viscometer

The viscometer shown in Fig. 2 was designed for the viscosity measurement of very small samples, and for viscosities not greater than about 5,000 centistokes. It has proven to be very useful in research work when only a few drops of liquid were available for test and for use in refinery control laboratories for the less viscous opaque liquids. The sample is introduced through (1) and flows into the horizontal tube (6) until the meniscus stands at (5) on the siphon (4). After standing to come to bath temperature, suction is applied at (3) to start flow through the siphon (4) and into the capillary (11). The passage of the meniscus between lines (9) and (10) is timed and the kinematic viscosity is calculated by Equation 5.

Two positions of the bulb (12) are shown in Fig. 1. Position "A" requires a longer capillary for a fixed head and volume of bulb (12) and the diameter is increased thereby. This increase in diameter is desirable in the case of relatively small-bore capillaries to avoid the clogging effect of foreign matter and to provide a free passage for cleaning. On the other hand, for the larger constants, a shorter-length capillary is desirable in order to limit the volume of liquid in the capillary and bulb to the definitely limited capacity of

the horizontal tube.

Drainage, surface tension, and kinetic energy.—The diameter of the horizontal tube (6), Fig. 1 and 2, is such that a meniscus of uniform shape is maintained during passage of the meniscus along the tube during test without drainage backward along the bottom of the tube. The small difference in the shape of the meniscus, observed in tests of various liquids in the range of any given viscometer, was assumed to be a negligible factor in the results. This was confirmed by tests with various petroleum liquids of known viscosities in a given viscometer and by tests in various viscometers in which the flow time for the same liquid was greatly different. The net result was that in the horizontal tube neither "drainage" nor difference in the surface tension of the petroleum liquids tested had an appreciable effect on the accuracy of the results.

The average inside diameter of the bulb (2) between lines (9) and (10) is made as nearly as possible the same as the diameter of meniscus formed in the horizontal tube (6) to reduce to a minimum the effect of any difference in surface tension.

Kinetic energy is given to the liquid as it enters the capillary and this decreases the hydrostatic head. Corrections for this factor can be estimated by Equation 4 by substituting volume and time of flow and length of capillary. The calculations will show that the correction due to this factor is less than 0.1 per cent under the most severe conditions, for example, for a flow time as low as 50 seconds in the case of viscosities in the region of 1 centistoke. This factor can therefore be disregarded and the viscosities may be accurately estimated by the simple Equation 5.

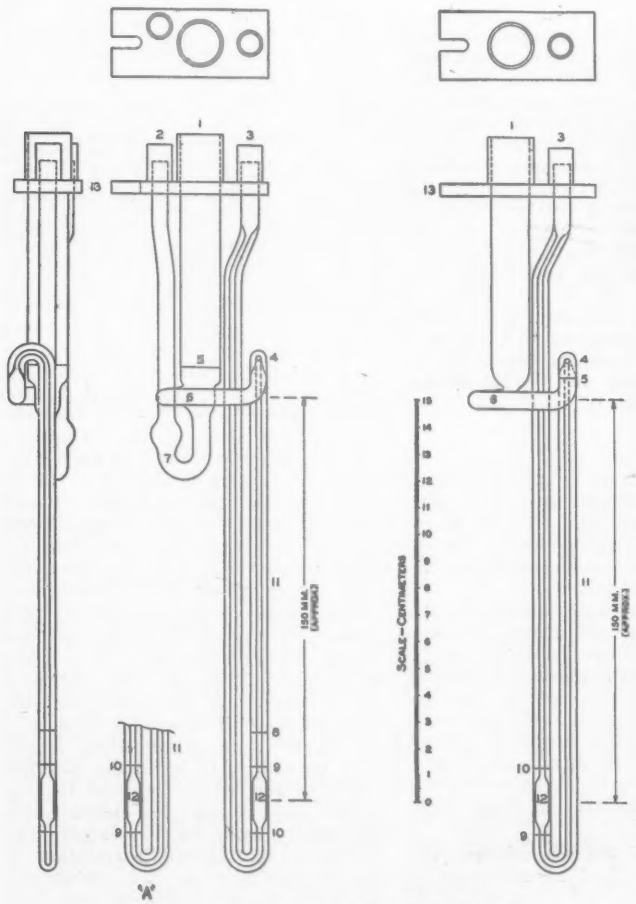
The dimensions of the viscometers shown in Figs. 1 and 2 were based on the following considerations. The average head, length of capillary (11) and volume of the receiving bulb (12) were arbitrarily chosen. The inside diameter of the horizontal tube (6) was made as large as possible and was limited to a size that assured a well-formed meniscus without drainage backward. The maximum outside horizontal dimensions of the assembled glassware were limited to accommodate the same size supporting head as is used in the regular Zeitfuchs viscometer and to make the two types interchangeable in the baths.

Poiseuille's Equation 1, given below, was used as a guide for establishing the relation between head, length and diameter of the capillary.

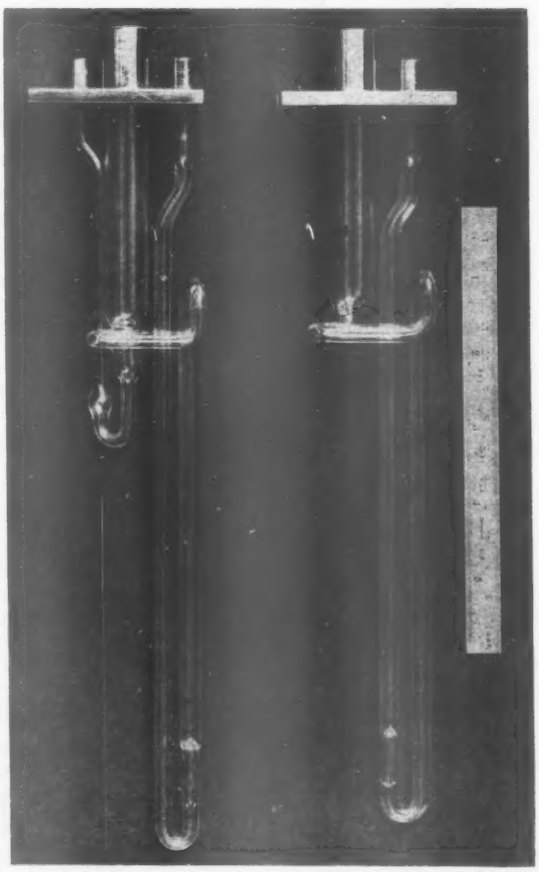
TABLE 1—RANGE AND DIMENSIONS OF VISCOMETERS
Figs. 1 and 2*

Constant C × 100	Capillary Diameter mm.	Capillary Length mm.	Lower bulb volume ml.	Head (average) mm.	Horizontal tube diameter mm.	Viscosity range for 100-750 Sec. flowtime centistokes
0.02	0.449	210	0.35	150	3.8	2-15
0.1	0.671	210	0.35	150	3.8	10-75
0.2	0.798	210	0.35	150	3.8	20-150
1.0	1.195	210	0.35	150	3.8	100-750
3.0	1.424	165	0.3	150	4.3	300-2,250
5.0	1.618	165	0.3	150	4.3	500-3,750
10.0	1.926	165	0.3	150	4.3	1,000-7,500
20.0	2.288	165	0.3	150	4.3	2,000-15,000
50.0	2.876	165	0.3	150	4.3	5,000-37,500

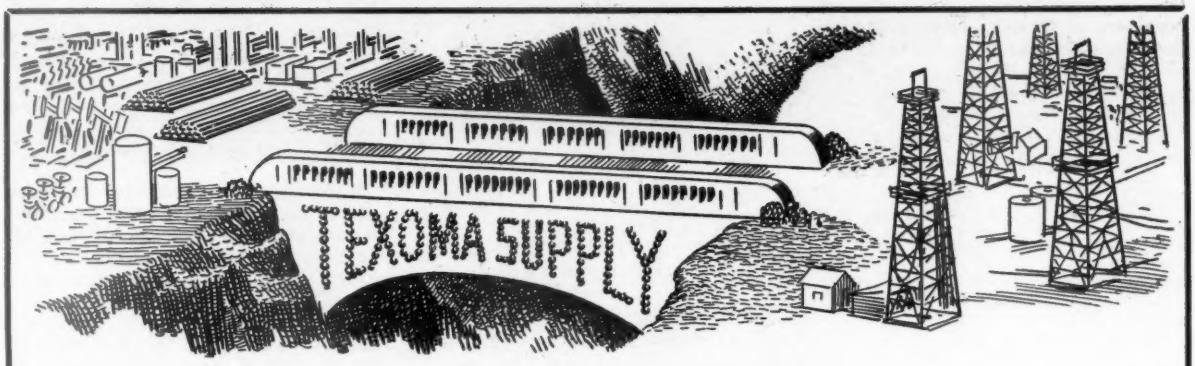
*For constants up to 5.



Figs. 1 and 2—Kinematic viscometer details



Figs. 3 and 4—Photograph of kinematic viscometers



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volume, and time of flow. The dimensions of these parts estimated on this basis are shown in Table 1.

$$K = \frac{U}{d} = \frac{\pi g H R^4 t}{8VL} = \frac{MV}{8\pi Lt}$$

Poiseuille's equation (1)

$$K = Ct - \frac{C_1}{t} \quad (2)$$

$$C = \frac{\pi g H R^4}{8VL}$$ Viscometer Constant (3)

$$C_1 = \frac{MV}{8\pi L}$$

"Kinetic energy correction constant" (4)

$K = Ct$ Neglecting term $\frac{C'}{t}$ (5)

$$R = \sqrt[4]{\frac{8CVL}{\pi g H}}$$ Capillary radius, cm. (6)

U = Absolute viscosity, poises
K = U/d = Kinematic viscosity, stokes
d = Density of liquid at temperature of measurement, gm. per ml.
H = Average head of liquid, cm.
R = Radius of capillary, cm.
L = Length of capillary, cm.
V = Volume of liquid flow, ml., in time t, seconds
M = 0.56, a constant established for capillaries with trumpet-shaped ends (7), (9), (10)
g = gravitational constant.

Viscometers are readily constructed by the glass blower with constants within about 10 per cent of the fixed values given. Final adjustment to exact values of the constants, when desirable, are made by changing the volume of the lower bulb slightly and by locating the graduation lines (9) and (10) during calibration.

Calibration.—The viscometers are calibrated with liquids of known kinematic viscosity by Equations 2 or 5. In the lower ranges, up to about 100 centistokes, the viscosities of the calibrating liquids are established in the regular Zeitfuchs' viscometer with the viscosity of water as a basis. The viscosities of the calibrating liquids higher than about 100 centistokes are established in the series of viscometers shown in Table 1. In the standardization procedure the flow time in any given viscometer is limited arbitrarily between about 100 and 600 seconds.

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Alverd C. Stutson has been appointed chief engineer of the technical division, industrial section, of Socony-Vacuum Oil Co., Inc., succeeding **W. G. G. Godron,** who retired. **Gerald J. Van Liew,** formerly staff engineer, succeeds Stutson as assistant chief engineer. Stutson, an authority on power equipment operation and lubrication, was a consultant on critical problems with the Navy and Maritime Commission during the war.

Gordon H. Lovejoy, since 1937 assistant superintendent of the order and distribution division of Continental Oil Co., has been promoted to superintendent, taking the place of **L. J. Morgan,** who retired after 46 years' service. Lovejoy joined Continental in 1924 as a junior clerk.

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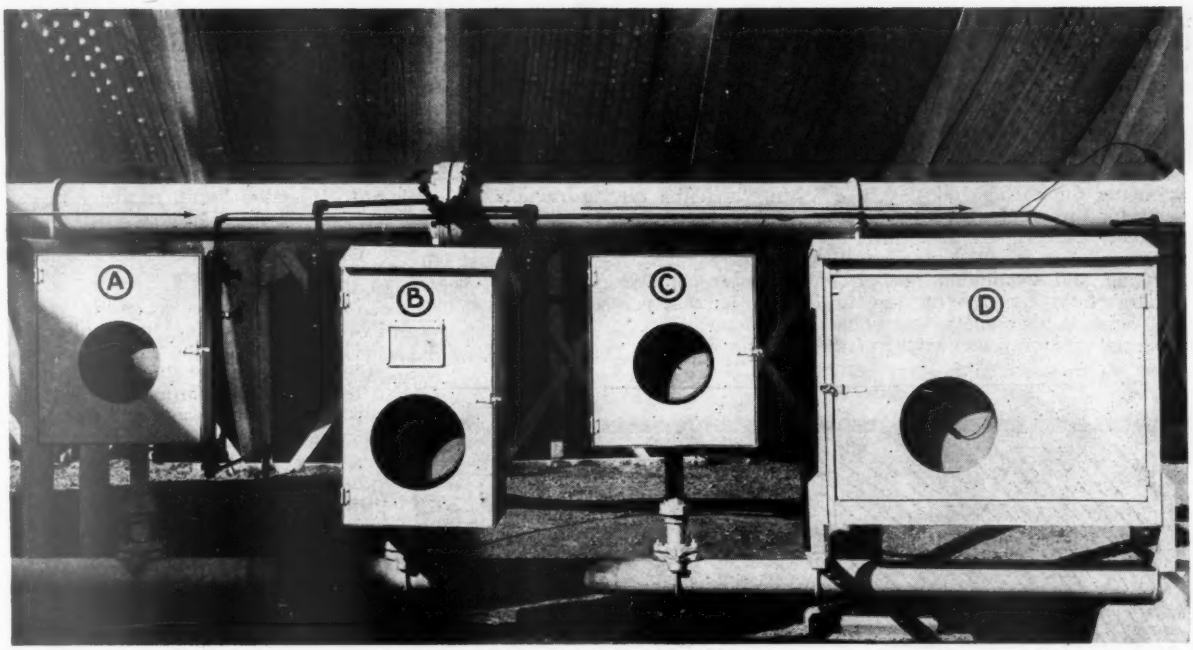
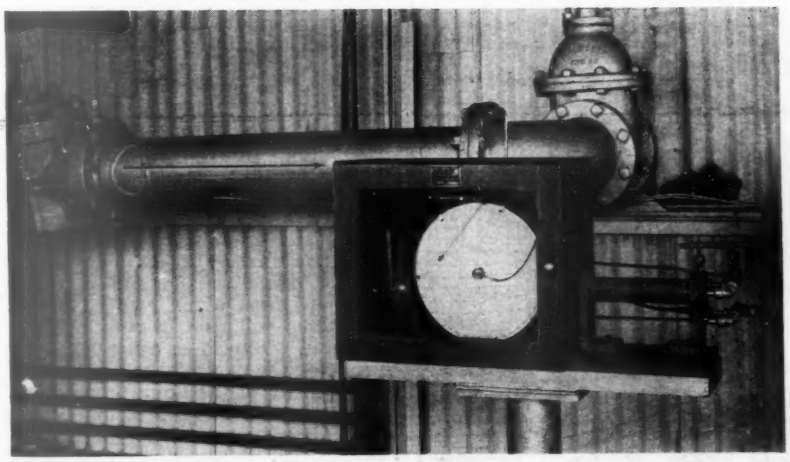


Accounting of propane-butane is being done "in the line" by this instrumentation. "A" is a recording pressure controller maintaining the desired pressure at the orifice plate. It is very important that the pressure at the orifice be twice the absolute pressure of the raw gasoline. "B" records the differential pressure across the orifice, and the flow in gallons per hour. "C" records temperature of flow in the line, and "D" registers the specific gravity of the gasoline flow stream

Recording Gravitometers In Accounting for Propane-Butane Production

by Kenneth B. Barnes



This recording gravitometer, in the "make room" of a large gasoline plant, compensates automatically for temperature changes occurring above or below 60° F. or other preselected level

RECORDING gravitometers are playing an interesting part in one method of casinghead-gas accounting where the purpose is to make additional payments for casinghead gas due to sale of butane-propane or other liquefied-petroleum-gas products which are manufactured and sold in excess of the 26-lb.-vapor-pressure-equivalent natural gasoline manufactured. Inasmuch as natural gasoline was manufactured for many years before the growth of the present liquefied-petroleum-gas industry, the method of accounting for casinghead based on the natural-gasoline content and residue gas sales values naturally has become more or less uniform. Casinghead-gas purchase contracts generally have provided for a gas price which is equivalent to a percentage of the gasoline content gallons, as reflected by a field charcoal or compression test, multiplied by a quoted 26-70 natural-gasoline sales price, plus an additional amount due to sales of residue gas usually based on a percentage of the net value received by the plant operator for such sales.

Many Contracts Provide for LPGs

Because of increased uses of liquefied petroleum gases such as butane and propane, an additional value is being paid for the natural gas or casinghead gas due to the sale of these products. Consequently, many gas-purchase contracts now contain a supplementary price clause providing for either a fixed increase in pay-

ment for the casinghead gas or for an increase based on some percentage of the proceeds received from the sale of butane and propane which are liquefied and sold in excess of the 26-lb.-vapor-pressure equivalent of the natural gasoline manufactured.

The mechanics of making increased payments for casinghead gas to account for income realized from sales of butane and propane sometimes are cumbersome either because of the changing and expanding market or because of the fugitive, hard-to-store nature of the products themselves. Bonuses based on a percentage of the proceeds received from actual sale of butane and propane require an involved accounting procedure which necessitates that accurate records be kept concerning natural-gasoline production as well as butane and propane production, sales, and sales value. In the case of a large operation in which the raw unfractionated liquid recovery from one or more plants is commingled for fractionation in a central plant, the records must separate each lot of butane and propane in order that proceeds therefrom may be determined.

One method of paying an additional consideration for L.P.G. products is based on the gravity of the raw unfractionated liquid recovery in the gasoline plant. To the percentage figure customarily used in determining the gasoline content value of the gas a fixed percentage is added for each degree of gravity of the raw unfractionated liquid recovery in excess of 93° A.P.I.

Gravitometer Follows Correlation Data

In application, a recording gravitometer is used for the continuous determination of the gravity of the raw unfractionated liquid recovery. After initial correlation of the specific gravities and composition of such mixtures, the gravitometer has been found successful in determining "composition" and the low-temperature fractional analyses could be dispensed with in so far as routine accounting is concerned. Preliminary trials of the procedure disclosed that since the content and recovery of pentanes and heavier hydrocarbons were essentially constant any variation in gravity of the gross product proved to be closely related to the butane and propane content of such gross product.

As used in the system, the gravitometer, in conjunction with a recording thermometer, gives an instantaneous and continuos record of stream gravity which may be interpreted in terms of stream purity or composition.

Pictured is one indoor installation of a recording gravitometer in such service. In the other view is an outside mounting, together with orificemeter settings. The gravitometer illustrated is the Arcco-Anubis model.

In operation, the liquid sample to the gravitometer flows through the intake tube into the bulb and then out the other tube. The tubes act as a delicate spring balance, allowing the counterbalanced bulb and its contents to sink or rise as gravity of the liquid increases or decreases.

The record made on the chart is the specific gravity of the liquid at 60° F., or other predetermined temperature, no matter what the actual temperature of the line fluid may be. This temperature correction is accomplished through the action of a bimetallic thermostatic coil enclosed in a thin tube. The coil is immersed in and surrounded by the flowing sample under pressure. The coil responds to changes in the temperature of the liquid sample and regulates the movement of an arm connected with the coil and connecting rod, which in turn acts on a floating lever actuating the pen mechanism. The actual density of the liquid in the bulb and its temperature accordingly are coordinated to give an integrated value which is recorded on the chart as the specific gravity of the sample, as of 60° F.

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Principal Features of the Casinghead-Gas Contract

"THOSE casinghead gas contracts are legal matters and do not concern me since I am not a lawyer." While it is true that the contracts themselves are legal instruments, the arrangement calls for the performance of many specific operating details that fall squarely in the lap of the field and production man. These cannot be dismissed simply as "legal matters." They are important parts of his day-to-day job and a definite part of his responsibility. They entail engineering and operating fundamentals.

Contract Involves the Field Man

The casinghead contract in some way involves most people working with oil wells, separators, gas gathering and gas return systems, pressure-maintenance and repressuring projects, natural gasoline manufacturing plants, and similar phases of producing operations. The importance cannot be overemphasized as to what a casinghead gas contract is, why there is need for such contracts, the variables which may occur under a specific contract, and the differences possible between any two contracts.

If one is not informed on this subject, or if one has not taken the trouble to ascertain the provisions of the contract for the particular lease with which he is concerned, it is possible for substantial losses to occur. Moreover, negligence in not doing certain things called for by the contract may lay the arrangement open to cancellation, and misunderstandings may lead to errors which will necessitate going back over the gas handling for correction, entailing considerable trouble and expense.

Seller and buyer.—There are two parties to every casinghead gas contract, the "seller" and the "buyer." Seller is the party that owns the properties and wells which are productive of oil and casinghead gas. The buyer is a concern that owns the natural-gasoline-manufacturing plant and that purchases the gas for extracting gasoline and possibly L.P.G. products.

Provisions of Casinghead Gas Contracts

A casinghead-gas contract, like an oil and gas lease, a surface rental, a right-of-way agreement, or other contracts, need not mandatorily follow any specific form nor include any set provisions. However, casinghead-gas handling and accounting are complex and many-sided (gathering, metering, extraction, residue return, etc.) and consistently or uniformly arranged handling is highly desirable.

It is easy to understand the necessity of a standard form of contract for smooth flowing and efficient routine usage. In the early days of "casinghead," no fixed standards or systematized contracts existed, and much confusion and lost motion resulted. Each separate contract consisted of several typewritten pages, and the wording of basic phases often was different, contract by contract. The Natural Gasoline Association of America, an organization of gasoline-plant operators (most of whom were both buyers and sellers of gas) and foremost technologists, a number of years ago formulated a standardized and clear-cut printed-form type of contract which greatly assisted the industry and has been widely used. The association has revised this form from time to time in accordance with changing conditions within the industry. The following items briefly discuss the most important provisions of the "N.G.A.A." casinghead-gas contract.

Price to be paid.—(a) The price per thousand is computed by multiplying the gasoline content per thousand cubic feet of gas (g.p.m.) by the sales price per gallon of gasoline and the applicable "per cent" due the seller. The "per cent to seller" is determined from Table 1.

Table 1 has been established from much operating and economic experience on many typical gasoline plants. It involves two basic factors: (1) the sales price of gasoline and (2) the g.p.m. of the gas. It is obvious that the higher the price of gasoline and the richer the gasoline content of the gas, the greater is the worth of the casinghead gas to the buyer. Table 1 reflects these conditions for closely bracketed variations of both price and content.

Example.—Under a casinghead gas contract producing company "A" delivers to gasoline plant "B" 3,200 M.c.f. of gas which has a g.p.m. content of 1.40, when the price is 4.5

TABLE 1—"PER CENT TO SELLER." MULTIPLY BY PRICE PER GALLON AND G.P.M.

Sales price of Gasoline in Cents per Gallon	Gasoline Content in Gallons per 1,000 Cubic Feet of Gas.												
	.0 to .25	.25 to .50	.50 to .75	.75 to 1.00	1.00 to 1.25	1.25 to 1.50	1.50 to 1.75	1.75 to 2.00	2.00 to 2.25	2.25 to 2.50	2.50 to 2.75	2.75 to 3.00	3.00 and above
	Percent												
0.5 to 1.0	5.	5.	5.	6.25	7.5	8.75	10.0	11.25	12.5	13.75	15.0	16.25	17.5
1.0 to 1.5	5.	5.	6.25	7.5	8.75	10.0	11.25	12.5	13.75	15.0	16.25	17.5	18.75
1.5 to 2.0	5.	6.25	7.5	8.75	10.0	11.25	12.5	13.75	15.0	16.25	17.5	18.75	20.0
2.0 to 2.5	6.25	7.5	8.75	10.0	11.25	12.5	13.75	15.0	16.25	17.5	18.75	20.0	21.25
2.5 to 3.0	7.5	8.75	10.0	11.25	12.5	13.75	15.0	16.25	17.5	18.75	20.0	21.25	22.5
3.0 to 3.5	8.75	10.0	11.25	12.5	13.75	15.0	16.25	17.5	18.75	20.0	21.25	22.5	23.75
3.5 to 4.0	10.0	11.25	12.5	13.75	15.0	16.25	17.5	18.75	20.0	21.25	22.5	23.75	25.0
4.0 to 4.5	11.25	12.5	13.75	15.0	16.25	17.5	18.75	20.0	21.25	22.5	23.75	25.0	27.0
4.5 to 5.0	12.5	13.75	15.0	16.25	17.5	18.75	20.0	21.25	22.5	23.75	25.0	27.0	29.0
5.0 to 5.5	13.75	15.0	16.25	17.5	18.75	20.0	21.25	22.5	23.75	25.0	27.0	29.0	31.0
5.5 to 6.0	15.0	16.25	17.5	18.75	20.0	21.25	22.5	23.75	25.0	27.0	29.0	31.0	33.3
6.0 to 6.5	16.25	17.5	18.75	20.0	21.25	22.5	23.75	25.0	27.0	29.0	31.0	33.3	33.3
6.5 to 7.0	17.5	18.75	20.0	21.25	22.5	23.75	25.0	27.0	29.0	31.0	33.3	33.3	33.3
7.0 to 7.5	18.75	20.0	21.25	22.5	23.75	25.0	27.0	29.0	31.0	33.3	33.3	33.3	33.3
7.5 and above	20.0	21.25	22.5	23.75	25.0	26.25	29.0	31.0	33.3	33.3	33.3	33.3	33.3

NOTE: Each gasoline content and sales price division in the schedule includes the smaller but excludes the larger figure. For gas at pressures adequate for processing without use of compressors, increase "per cent" by adding five thereto, provided in no such case shall the total be more than 33.3 per cent.

cents per gallon. How much money is due A from B under the contract?

Solution.—3,200 M × 4.5c/gal. × 18.75% = $27.00.

(b) If buyer's gasoline plant sells surplus volumes of residue gas, the seller is entitled to 50 per cent of the proceeds after the deduction of any costs of purifying, boosting and transportation necessary in making the sale. The contract specifies the procedure for allocating the total surplus volume of residue gas sold, as between all leases that sell casinghead gas to the plant.

(c) If the plant manufactures products other than 26-70 gasoline (such as L.P.G.), the seller may receive additional compensation. This compensation usually is set forth in supplemental agreements to the original contract.

Gasoline content and specific gravity.—The g.p.m. may be tested by either the field compression or charcoal adsorption methods, at seller's option. The gas so tested is measured in cubic feet at a pressure of 4 oz. above 14.4 (usually) psi. and 60° F. The specific gravity usually is determined by the gas balance*, rarely by the effusion† method.

The tests are made at quarter-year intervals except when, due to unusual conditions, either party asks for special tests. The buyer (and tester) is obligated to notify the seller, in writing, 10 days before the quarterly tests, so that the seller may have a representative present to witness the test or make his own joint tests.

Measurement of casinghead gas.—The buyer furnishes, installs, operates, and keeps in repair the orifice meter. Upon request, the buyer will send the meter charts to the seller for checking. The meter is subject at all times to inspection by the seller in the presence of the buyer. Accuracy of the meter can be tested upon the request of either party. The expense of such special tests, however, is to be borne by the seller if the meter is found to be correct. Registration within 3 per cent of true values is considered correct. If the meter is inoperative or incorrect, settlement for the period is based on the average readings for the last 10 days of prior, and the first subsequent 10 days of true operation.

The meter readings are computed in cubic feet of gas on the basis of 4 oz. above 14.4 (usually) psi. and 60° F. An assumed flowing temperature is stipulated which represents the average year-around temperature.

Royalty. — The seller accounts to the royalty owners of the lease for the royalty on the casinghead gas sold to the buyer.

Residue gas. — When the casinghead gas is delivered to the gasoline plant, the extraction of the natural gasoline therefrom causes a reduction in its volume. It also is necessary for the plant to use some of the stripped gas for compressor and boiler fuel. Therefore, part of the casinghead gas volume is used up by "extraction of gasoline and plant use." The stripped, dry, or "residue" gas thereafter remaining is called the "available residue gas" and under the contract must be returned by the plant to the boundary line of the seller's property for lease operation, if he wants it.

The amounts of casinghead gas used up ("shrinkage") in extraction of gasoline and in plant use have been determined from much operating data on typical plants. The "percentage of remaining or available residue" is determined from Table 2. Naturally, the richer the gas, the less is the percentage of "remaining residue." For example, with gas of 1.50 g.p.m. content only 22 per cent of the volume is used up in extraction of gasoline and plant use, and there is 78 per cent remaining as residue. However, for a gas of 12.70 g.p.m. content, the remaining residue volume is only 0.10 per cent of the original. Casinghead gas richer than 12.70 g.p.m. is considered to have no remaining residue volume, and in fact, sometimes in the past negative percentages have been applied to residue computations when gas to be returned to the leases was scarce and was purchased from outside sources at high prices.

The gasoline plant is not obligated to furnish residue gas to the producing properties beyond that specified in Table 2. However, sometimes the gasoline plant might be short of residue gas sufficient to meet all requirements, and accordingly has been connected to outside sources of dry or fuel gas. In this case, a supplemental agreement may be made whereby the gasoline plant will sell to the leases makeup gas above that due under Table 2. It is possible that this outside makeup gas may be rather high in price. Accordingly, those people (of the seller) having to do with using residue gas should ascertain from the contract the cost of such makeup gas so that they will know just how much their use of this commodity is costing them.

References

*Engineering Fundamentals No. 59, "Balance Method of Determining Specific Gravity of Natural Gas," The Oil and Gas Journal, December 24, 1942.

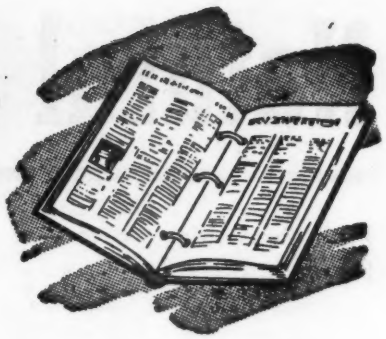
†Engineering Fundamentals No. 58, "Determining the Specific Gravity of Gas by the Effusion Method," The Oil and Gas Journal, December 17, 1942.

TABLE 2—PERCENTAGE OF CASINGHEAD GAS REMAINING AS RESIDUE AFTER EXTRACTION OF GASOLINE AND PLANT USE. BASED UPON GASOLINE CONTENT IN GALLONS PER 1,000 CU. FT. (G.P.M.)

G.P.M.	%	G.P.M.	%	G.P.M.	%	G.P.M.	%	G.P.M.	%	G.P.M.	%	G.P.M.	%	G.P.M.	%
.00	0	1.50	78.00	3.00	63.40	4.50	50.00	6.00	38.30	7.50	28.30	9.00	19.20	10.50	11.00	12.00	3.50
.05	93.10	1.55	77.50	3.05	62.95	4.55	49.65	6.05	37.90	7.55	28.00	9.05	18.85	10 55	10.75	12.05	3.25
.10	92.60	1.60	77.00	3.10	62.50	4.60	49.30	6.10	37.50	7.60	27.70	9.10	18.50	10.60	10.50	12.10	3.00
.15	92.10	1.65	76.50	3.15	62.00	4.65	48.85	6.15	37 20	7.65	27.30	9.15	18.20	10.65	10.25	12.15	2.75
.20	91.60	1.70	76.00	3.20	61.50	4.70	48.40	6.20	36.90	7.70	26.90	9.20	17.90	10.70	10.00	12.20	2.50
.25	91.05	1.75	75.50	3.25	61.00	4.75	47.95	6.25	36.55	7.75	26.70	9.25	17.60	10.75	9.75	12.25	2.30
.30	90.50	1.80	75.00	3.30	60.50	4.80	47.50	6.30	36.20	7.80	26.50	9.30	17.30	10.80	9.50	12.30	2.10
.35	90.05	1.85	74.50	3.35	60.15	4.85	47.15	6.35	35.80	7.85	26.20	9.35	17.05	10.85	9 25	12.35	1.85
.40	89.60	1.90	74.00	3.40	59.80	4.90	46.80	6.40	35.40	7.90	25.90	9.40	16.80	10.90	9.00	12.40	1.60
.45	89.00	1.95	73.45	3.45	59.30	4.95	46.35	6.45	35.10	7.95	25 50	9.45	16.50	10.95	8.75	12.45	1.40
.50	88.40	2.00	72.90	3.50	58.80	5.00	45.90	6.50	34.80	8.00	25.10	9.50	16.20	11.00	8.50	12.50	1.20
.55	87.85	2.05	72.45	3.55	58.35	5.05	45.50	6.55	34.45	8.05	24 80	9.55	16.00	11.05	8.25	12.55	.90
.60	87.30	2.10	72.00	3.60	57.90	5.10	45.10	6.60	34.10	8.10	24.50	9.60	15.80	11.10	8.00	12.60	.60
.65	86.80	2.15	71.50	3.65	57.40	5.15	44.75	6.65	33.80	8.15	24.25	9.65	15.50	11.15	7 70	12.65	.35
.70	86.30	2.20	71.00	3.70	56.90	5.20	44.20	6.70	33 50	8.20	24.00	9.70	15.20	11 20	7.40	12.70	.10
.75	85.75	2.25	70.50	3.75	56.55	5.25	43.85	6.75	33.15	8.25	23.65	9.75	14.95	11.25	7.20	.....	.....
.80	85.20	2.30	70.10	3.80	56.20	5.30	43.50	6.80	32.80	8 30	23.30	9 80	14.70	11.30	7.00	.....	.....
.85	84.70	2.35	69.60	3.85	55.75	5.35	43.05	6.85	32.50	8.35	22.95	9.85	14.45	11.35	6.75	.....	.....
.90	84.20	2.40	69.10	3.90	55.30	5.40	42.60	6.90	32.20	8.40	22.60	9.90	14.20	11.40	6.50	.....	.....
.95	83.65	2.45	68.65	3.95	54.80	5.45	42.25	6.95	31.85	8.45	22.30	9 95	13.95	11.45	6.25	.....	.....
1.00	83.10	2.50	68.20	4.00	54.30	5.50	41.90	7.00	31.50	8.50	22.00	10.00	13.70	11.50	6.00	.....	.....
1.05	82.50	2.55	67.70	4.05	53.85	5.55	41.55	7.05	31.15	8.55	21.70	10.05	13 35	11.55	5.80	.....	.....
1.10	81.90	2.60	67.20	4.10	53.40	5.60	41.20	7.10	30.80	8.60	21.40	10.10	13.00	11.60	5.60	.....	.....
1.15	81.40	2.65	66.70	4.15	52.95	5.65	40.80	7.15	30.50	8.65	21.10	10.15	12.75	11.65	5.35	.....	.....
1.20	80.90	2.70	66.20	4.20	52.50	5.70	40.40	7.20	30.20	8.70	20.80	10.20	12.50	11.70	5.10	.....	.....
1.25	80.40	2.75	65.75	4.25	52.15	5.75	40.15	7.25	29.85	8.75	20.55	10.25	12.25	11.75	4.85	.....	.....
1.30	79 90	2.80	65.30	4.30	51.80	5.80	39.90	7 30	29.50	8.80	20.30	10.30	12.00	11.80	4.60	.....	.....
1.35	79.45	2.85	64.90	4.35	51.30	5.85	39.50	7.35	29.25	8.85	20.05	10.35	11.75	11.85	4.35	.....	.....
1.40	79.00	2.90	64.50	4.40	50.80	5.90	39.10	7.40	29.00	8.90	19.80	10.40	11.50	11.90	4.10	.....	.....
1.45	78.50	2.95	63.95	4.45	50.40	5.95	38.70	7.45	28.65	8.95	19.50	10.45	11.25	11.95	3.80	.....	.....

The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL



Diesel-Fuel Performance

IGNITION QUALITY

Cetane No. (delay method)	Diesel Index	Blending Oct. No.	B.P. Gravity Number
30	19	51	201
35	27	43	196
40	37	35	191
45	45	27	187
50	53	19	183
55	59	11	180
60	65	2	178

VOLATILITY AND VISCOSITY

Mid B.P. (°F.)	Viscosity at 100° F. Saybolt sec.	Kinematic
450	33	2
500	35-36	2.3-2.8
550	38-41	3.6-4.7
600	42-52	4.9-8.0
650	50-76	7.4-15.0
700	65 & up	12.0 & up

Ignition quality. — Measured directly by centane number (D.M.) or by diesel index. Good ignition quality promotes easy starting and low combustion pressures (and engine temperatures) whereas low cetane number causes rough operation, misfiring, varnish on pistons, or other engine deposits and a high combustion pressure.

Viscosity and volatility. — High-viscosity high-boiling fuels cause engine deposits, exhaust smoke and odor, and slightly better economy in low-speed engines if cetane number is also high, whereas low-viscosity low-boiling fuels (below 35 seconds viscosity) promote a clean exhaust, fluidity in cold climates, smaller engine deposits, but the general efficiency may be lower due to poor lubrication of injectors, leakage, and low heating value.

Difficulty in starting.—Low-cetane number.

Engine roughness. — Low-cetane number.

Smoke or odor. — High-viscosity high-boiling fuel or high-carbon residue but 90 per cent point and endpoint have little direct effect.

Engine deposits.—High viscosity and low-cetane number.

Low fuel economy.—High-gravity and low-cetane number, but the effect is small. The load at which the engine operates is much more impertant.

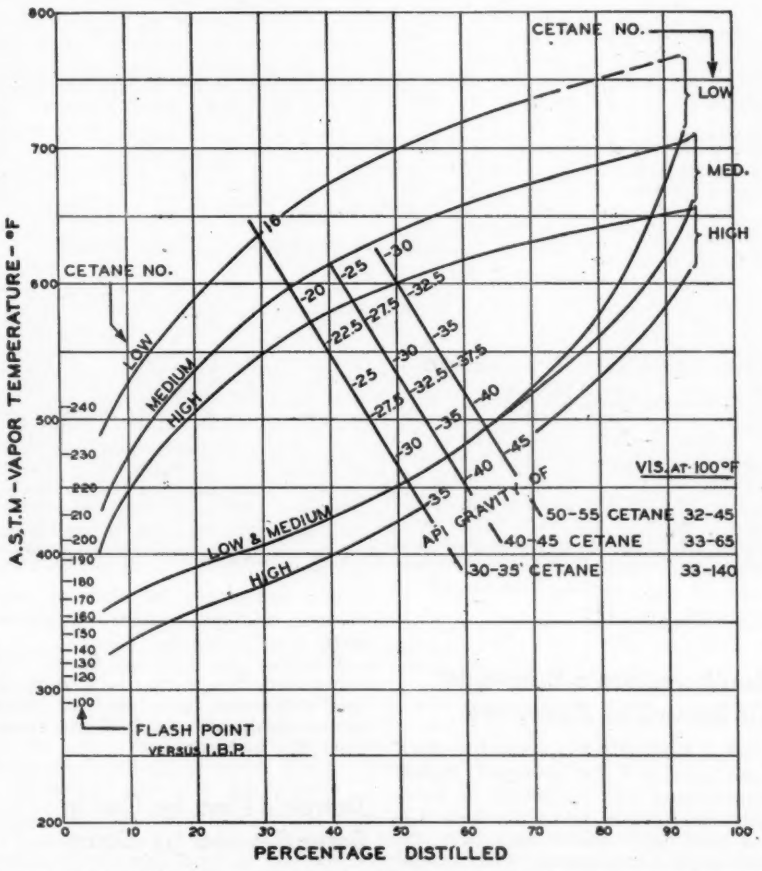


Fig. 1—A.S.T.M. distillation curves of diesel fuel oils. (Refer also to The Refiner's Notebook No. 72, December 15, 1945)

No. 76 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa

Natural Gas

Price Boost May Solve Gas Problem, Says Thompson

AUSTIN.—The problem of what to do with this state's flare gas may be solved, it is believed, by the higher prices for both natural gas and oil which Col. E. O. Thompson, of the Texas Railroad Commission, forecasts for 1946.

"Oil and gas producers can look forward, I firmly believe, to increased prices for both oil and natural gas in 1946," Thompson said. "Signs of increased prices are in the air.

"Heating oils and kerosene prices are pretty sure to be allowed to increase to augment supply in the very near future. It is only natural that crude oil price increases should follow. They long have been justified.

"The unusual increase in demand for natural gas will mean better prices at the well. It is my prediction that contracts will be made for gas at rates up to 10 cents per thousand at the well during 1946. At 10 cents per thousand most of the flare gas produced with oil will be saved for use.

"Lack of demand in the past made saving of this flare gas uneconomical. But at 10 cents it will be marketed or returned to the horizon for later use."

Country Used 3½ Trillion Cu. Ft. of Gas in 1945

DALLAS.—More than 3½ trillion cubic feet of natural gas was consumed by residents of the United States in 1945, according to figures compiled by Lone Star Gas Co. Lone Star officials said customers of gas companies totaled 20,156,000 at the close of the year, an increase of 1.9 per cent over 1944.

Southwestern's Surrender Of Securities Approved

PHILADELPHIA. — Southwestern Development Co.'s proposed capital contribution and surrender of securities to Natural Gas Pipe Line Co. has been approved by Securities and Exchange Commission. The capital contribution will be $2,427,766, and Southwestern will surrender for redemption $4,552,000 principal amount of first mortgage 6 per cent bonds, Series A, and $286,000 principal amount of 6 per cent debentures of Natural Gas.

Southwestern will use part of the proceeds from the redemption to make the capital contribution, to retire the $984,595 balance of a loan payable to Guaranty Trust Co. of New York, and to acquire from Guaranty a promissory note of its subsidiary, West Texas Gas Co., in the principal amount of $990,000. The transactions are part of an over-all plan of Natural Gas to reduce its long-term debt from $43,140,000 to $25,390,000.

Cunningham Allowable For January Is Reduced

TOPEKA.—Natural-gas production in the Cunningham pool, in Kingman and Pratt counties, western Kansas, is limited to 229,698,000 cu. ft. for January by an order of the state's conservation division. Of this allowable, 225,845,000 cu. ft. is allocated to the field's 27 dry gas wells and 3,852,000 to the four combination wells, to which a gas-oil ratio of 5,500 cu. ft. is assigned.

Panhandle Eastern Buys Leases From Shamrock

AMARILLO, Tex.—Transfer of 57,000 acres of Texas Panhandle natural-gas leases from Shamrock Oil & Gas Co. to the reserves of Panhandle Eastern Pipe Line Co. is announced here by Shamrock officials.

Both sweet gas and sour gas (the latter after desulfurization) will be delivered to a Panhandle Eastern terminal, starting June 1 with 30,000,000 cu. ft. daily. By terms of the contract, this volume is to be increased within 10 years to 60,000,000 cu. ft.

The leases are in Sherman and Moore counties, where Shamrock owns large holdings.

The price per 1,000 cu. ft. was not announced, but it was said to be in line with other pipe-line gas prices in the Panhandle field. These range from 3½ to 5 cents.

Detroit's Plea for Cut in Rates Denied by Court

LANSING.—The petition from the city of Detroit for a reduction in the rate schedule of Michigan Consolidated Gas Co. was denied by the Michigan Supreme Court. The city asked for the cut in order to speed payment of refunds totaling $10,000,000 which the company has been ordered to pay in the Detroit area.

The city sought the new schedule in lieu of a Public Service Commission order which, counsel for the city said, provided for distribution of the refund on the basis of a mathematical formula.

Detroit's city attorney, William F. Dowling, said the city would oppose as inadequate a $16,450,000 rebate to customers of Detroit Edison Co.

Texas Carbon-Black Output Up 179,634,217 Lb.

AUSTIN. — Carbon-black production in Texas during 1945 exceeded that of 1944 by 179,634,217 lb. The output in the year just closed was 662,912,593 lb. against 483,278,376. The state had 92,200,995 lb. of carbon black stored in 1945, compared with the 1944 storage figure of 54,558,974 in the preceding year.

The engineering department, oil and gas division, of the State Railroad Commission, which provided the statistics in a report to the commission, said the total sweet, sour, and casinghead gas production in Texas for 1945 was 2,648,069,745,000 cu. ft., approximtely 213,000,000,000 cu. ft. more than in 1944.

Natural Gasoline

Output of Natural Gasoline Shows Rise in October

WASHINGTON. — Daily average output of natural gasoline and allied products rose 8 per cent in October 1945 over September, according to Bureau of Mines, standing at 12,230,000 gal., compared with 11,661,000. Total demand was 12 per cent above that in September. Demand for natural and finished gasoline from trade outlets increased 16 per cent, liquefied petroleum gases for fuel and chemical uses 23 per cent, and shipments of light products to refineries 9 per cent.

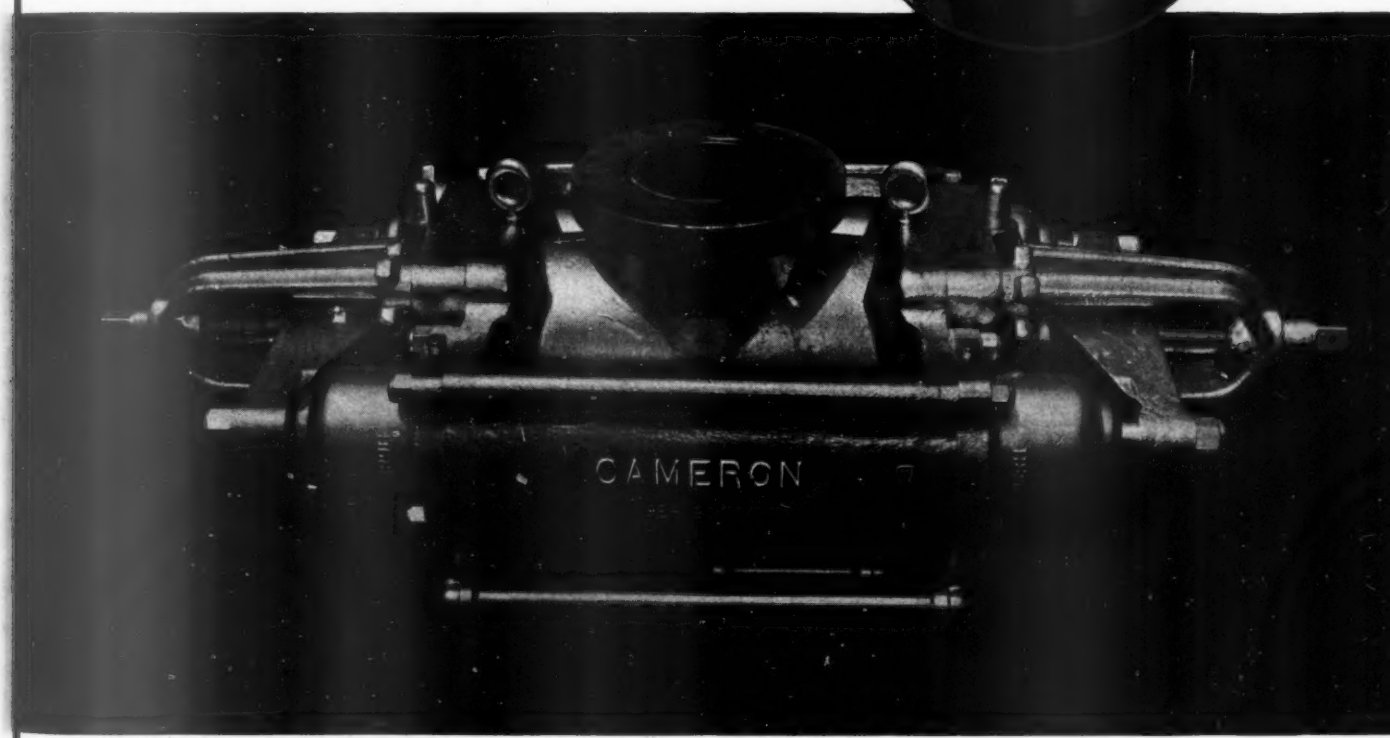
PRODUCTION
(Thousands of gallons)

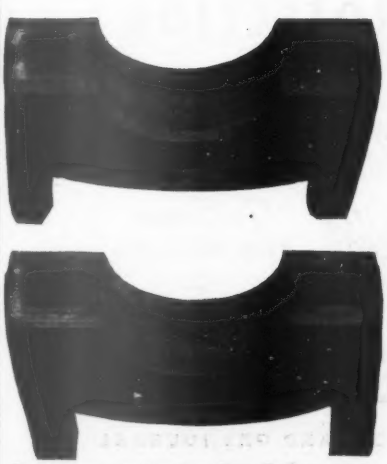
	October	September
Natural-gasoline mixture	26,636	29,583
Natural gasoline	185,444	180,228
Raw condensate	33,171	23,045
Liquefied petroleum gases:		
Commercial butane-propane mixture	26,386	20,257
Normal butane	31,883	27,719
Propane	34,704	23,280
Other mixtures (LPG)	12,011	8,632
Isobutane	11,668	11,342
Isopentane	2,448	4,488
Finished gasoline and naphtha	22,431	19,374
Other products	2,361	1,879
Total	379,143	349,827

Self Feeding

RAM PACKERS

Proven On Thousands of Earlier Cameron Models, Are "Standard Equipment" on Type "QRC" Blowout Preventers





These worn self-feeding Ram Packers were still sealing tightly when removed from a Cameron Blowout Preventer . . . evidence of blowouts that didn't happen, pipe that

Perhaps the greatest single mechanical feature developed by Cameron engineers for Cameron drilling control units is the patented self-feeding ram packing element whose efficiency in helping control destructive well pressures has been so clearly demonstrated on thousands of deep, high-pressure wells. When the rams are closed around the pipe, tough, wear-resistant, oil and gas resistant rubber automatically feeds out to effect a pressure tight seal. Pipe may be rotated and raised and lowered between joints thru the closed rams for hours at a time while steps are taken to subdue kicking well pressures. When finally worn out, the self-feeding ram packers can be easily replaced in the field.

Cameron patented self-feeding ram packing is one of several time-proven mechanical features incorporated in the design of the new Type "QRC" Pressure-Operated Blowout Preventer. Entirely new and revolutionary features of the "QRC" unit include: A quick ram change method whereby rams can be changed in only a few minutes while the unit is installed on the well, eight to one ratio of closing pressure to well pressure compared to three to one on earlier models, 10,000 lb. test models in 6" and 10" sizes, plus lower overall height, 30% less weight, and rugged all-steel construction.

Complete details will gladly be sent to interested operators on request.

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PIPE LINES

True Appointed Manager of Magnolia Pipe Line Co.

DALLAS. — L. H. True, formerly assistant manager of Magnolia Pipe Line Co., has been made manager, it is announced by J. L. Latimer, formerly vice president and general manager and recently promoted to the presidency. D. R. Gladney and R. G. Sanders have been elected members of the board.

L. H. TRUE

G. L. Johnson has been appointed cashier and R. M. Jones assistant cashier of both the Magnolia Petroleum Co. and the pipe line company. J. L. Terrell has been added to the industrial relations department.

Stanley and Bledsoe Buy Parkhill Truck Holdings

F. E. Stanley and C. C. Bledsoe, coparteners in Midwestern Engineers and other interests in Tulsa, have purchased all properties and equipment of Parkhill Truck Co., Tulsa, one of the country's largest oil-field and pipe-line trucking organizations.

The transaction includes pieces of heavy equipment consisting of trucks, rolling stock, trailers, floats, tractors, bulldozers, side boom tractors, etc., together with an office building, a warehouse, and a repair shop. The consideration involved was not named.

Carey Link, who was traffic manager of War Emergency Pipe Lines, Inc., the government-owned big-inch and little big-inch pipe lines, and later traffic manager for Tennessee Gas & Transmission Co.'s big natural gas pipe line from Texas to the East, has been made manager of Parkhill Truck Co., which will continue to operate under that name.

Stanley and Bledsoe are active in oil, gasoline, and natural-gas pipeline operations. Besides owning Midwestern Engineers, which does engineering work in connection with design and construction of pipe lines, pump stations and compressor stations, they are copartners in Midwestern Drillers, which drills wells; Midwestern Sales, which handles the sale of pipe coatings, wire lines and other oil-country equipment and materials, and in Stanley & Bledsoe Construction Co.

Parkhill Truck Co. was organized a little more than 25 years ago in Okmulgee by Roy F. Parkhill after he returned from serving overseas in a motor transport division in World War 1. His experience in that work caused him to decide to enter the trucking business at Okmulgee, then an active oil-field development center. Parkhill moved his headquarters to Tulsa in 1938. When he started his business in Okmulgee his equipment consisted of two small trucks.

California Commission Told State Needs Texas Line

LOS ANGELES. — The California Railroad Commission has finished its hearings on the application of Southern California Gas Co. and Southern Counties Gas Co. to construct a $12,000,000 pipe line from Blythe to

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Fort Madison, Iowa

Santa Fe Springs for taking delivery of natural gas from Texas.

During the 4 days of testimony, expert witnesses of the commission, El Paso Natural Gas Co., and the two local gas companies, presented statistics concerning natural-gas reserves in California and in Texas, along with estimates of this area's future fuel requirements.

Taking the stand as the final witness, F. S. Wade, president of Southern California Gas Co., said: "All available sources of natural gas in California are now being tapped, and we feel we would be negligent in our duty to our 1,100,000 customers, our employes, and our stockholders if we did not look many years ahead for an adequate future supply.

"Since 1940-41, discoveries of new natural-gas fields in California have not kept pace with the continuously increased demand, and it has come to a point where we have had to look beyond the state's borders for more gas. After exploring all available sources and concluding that these were insufficient to meet the demand, a study was made of gas that could be brought in from Mid-Continent fields.

"The best proposition that the two Southern California gas companies have had presented is the one from the El Paso Natural Gas Co., which has been presented at this hearing. This project will require no immediate financing program."

A.P.I. Names Personnel of Transportation Committee

NEW YORK. — Forty-one oil men have been named to American Petroleum Institute's newly created Division of Transportation which will headquarter in Washington in the space previously held by Petroleum Industry War Council.

B. Brewster Jennings, president of Socony-Vacuum Oil Co., Inc., is vice president of the A.P.I. Transportation Division with James E. Moss as division director.

Tennessee Gas Hearing to Reopen February 27

WASHINGTON. — Federal Power Commission will reopen on February 27 its hearing on the application of Tennessee Gas & Transmission Co. for permission to construct about 2,380 ft. of 8-in. line from a mainline valve in Harris County, Texas, to a connection with United Gas Pipe Line Co.'s Katy-Satsuma line; about 95 miles of 16-in. line from Hidalgo County to Nueces, and a dehydration plant. The commission will also consider the company's application to purchase four compressor stations in Mississippi, Tennessee, and Kentucky.

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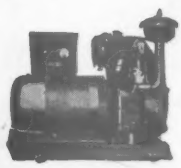

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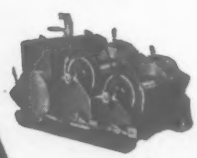

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REFINING

Chemical Unit Taken Over By New Shell Company

SAN FRANCISCO. — Shell Chemical Corp. has been incorporated in Delaware to take over the Shell Chemical Division of Shell Union Oil Corp. J. Oostermeyer, who was executive vice president of the chemical division, is president of the new company. W. P. Gage and L. V. Steck, vice presidents of the division, hold similar posts in the new organization. J. W. Watson, who was assistant secretary and assistant treasurer, is treasurer. These four, all residents of San Francisco, along with A. E. Lacombie, comprise the board of directors.

Plants are operated at Shell Point, Martinez, and Dominguez, in California, and soon the Houston plant will be absorbed. Some 2,000 persons are employed by the corporation. Products include ammonia, fertilizers, solvents and industrial chemicals.

Plans include further development of petroleum derivatives. The new company will continue operation of a butadiene plant at Torrance, Calif., for the Office of Rubber Reserve. Headquarters will remain in San Francisco.

Ways of Finding Molecular Size and Shape Described

NEW YORK. — Dr. Herman F. Mark, professor of organic chemistry at Polytechnic Institute of Brooklyn and head of High Polymer Research Institute, speaking at a symposium of American Chemical Society's division of industrial and engineering chemistry, presented a report describing several methods used to determine the size and shape of polymer molecules. Two of these were developed during the war.

Dr. Mark said that if the manufacturer of tough durable coverings is to protect metal equipment from rust he must know whether the final film is composed of long, straight molecules or curled-up molecules. The measurement of light scattering was described as a new method for determining molecular size and shape; also the ultracentrifuge is used to investigate molecular structure of materials.

Particles too small to be seen with an optical microscope can be measured rapidly and with a high degree of accuracy by a method worked out at the experimental station of E. I. duPont de Nemours & Co. This technique, described by Emerson D. Bailey, consists in passing light of different colors through a suspension of the particles in a liquid and then measuring the amount of light of each color that emerges. Particles of different sizes transmit the different colors at different rates. The operation requires about 2 hours with the use of relatively simple laboratory equipment.

Motorist Promised Better Gasoline for His Dollar

NEW YORK. — Technical progress of the refining industry during the war, especially in catalytic cracking, promises the American motorist better gasoline for his dollar in 1946, according to L. H. Harvison, vice president of M. W. Kellogg Co., petroleum engineers, in a year-end statement.

"While many basic industry problems remain to be solved," Harvison said, "the outlook for 1946 from the engineer's viewpoint is an encouraging one. The equipment and processes necessary to the oil-refining industry for the fulfillment of its basic aim—improved service to the consumer—are either already installed or completely developed and ready for installation."

Better Fuels, Lube Oils Head Research Aims

NEW YORK.—Development of improved gasolines and lubricating oils for passenger cars, trucks, buses, and airplanes is a No. 1 item on the 1946 research plans of Socony-Vacuum Oil Co., Inc., according to B. Brewster Jennings, president.

Moreover, the company has extensive plans for improving industrial lubricants resulting in better efficiency and lower operating costs, for developing fuels and lubricants for continuous combustion power plants such as gas turbines, and for the expansion of production of chemicals for petroleum.

Expanded activities in such fields as diesel engines, road building, home construction, and automobile and airplane manufacturing will highlight 1946, the Socony-Vacuum executive pointed out.

"In addition to the development of

more efficient gasolines and lubricating oils, stimulated by the war, oil companies will also be active in many phases of postwar reconstruction and reconversion," Jennings said.

"Oil companies will benefit from the expected increase in the construction of new homes in 1946," he added. "For example, it is estimated that more than 300,000 new and old homes will require new burners this year. The average oil burner consumes over 2,100 gal. a year.

"Estimates indicate widespread construction activities in many fields in 1946. This should result in requirements for such petroleum products as fuels, lubricants, and specialties amounting to hundreds of millions of dollars.

"There has been a great reduction in demands for aviation gasoline since V-J Day but 1946 probably will see increasing requirements for petroleum products in private and commercial aircraft."

Referring to road building, Jennings said statistics presented recently by the Asphalt Institute indicated approximately 6,000,000 tons of petroleum asphalt should be required in 1946 to make up for the delayed maintenance on the 430,000 miles of the nation's paved highways.

Texaco and Union Agree on Terms of Settlement

Representatives of The Texas Co. and of the Oil Workers International Union reached an agreement last week providing for an increase of 18 per cent in the base pay rate for all employes at the West Tulsa refinery and for a night differential pay of 4 cents an hour for work between 4 p.m. and midnight and for 6 cents an hour for work between midnight and 8 a.m.

The union and the company notified the Navy Department in Washington of the settlement. The Navy has been supervising operation of the refinery since last October when a strike shut down the 22,000-bbl.-a-day plant. The refinery was turned over to the company Monday of this week.

The Texas Pipe Line Co. reached an agreement with its employes by granting a wage increase of 18 per cent.

Two Refineries Declared Surplus by RFC

WASHINGTON. — Two oil refineries have been declared surplus property by Reconstruction Finance Corp., one operated by Mohawk Petroleum Corp. and the other by The Pennzoil Co.

The Mohawk refinery, 3 miles west of Bakersfield, Calif., was built to produce 100-octane aviation fuel gasoline. It occupies 20 acres of land. There are about 20 service and functional units, with floor space totaling 30,000 sq. ft. These include reforming unit, alkylation unit, isomerization unit, gas-concentration unit and isopentane splitter. Equipment on the site includes laboratory and testing units. Water is supplied from a site well. Other utilities are obtained from private operators. A Santa Fe Railroad siding is adjacent to the property.

The Pennzoil plant at Oil City, Pa., is also a high-octane gasoline refinery. It includes some 15 structures on a site of 8.96 acres. Building space totals 31,900 sq. ft. Special process equipment includes alkylation and gas-concentration units. Local companies supply utility services, and a Pennsylvania Railroad siding provides transportation facilities.

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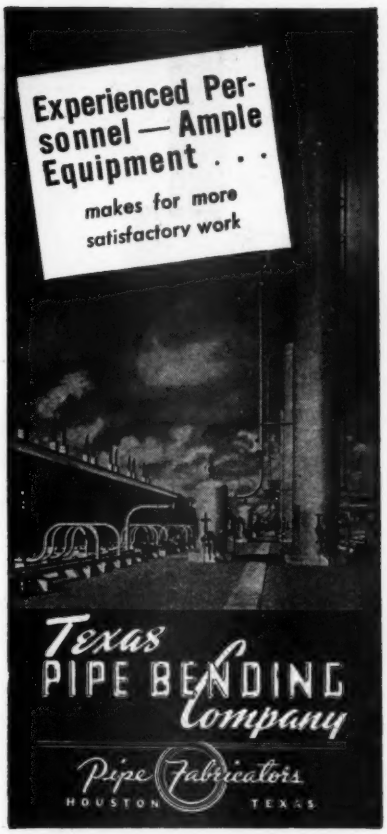

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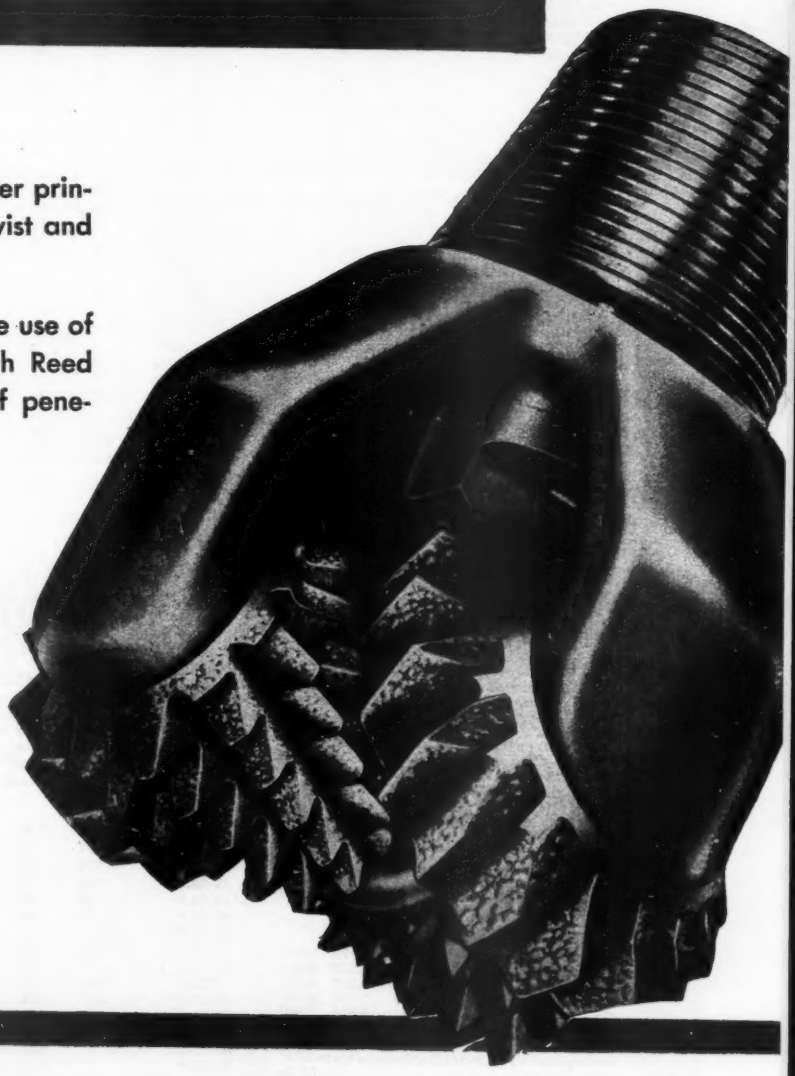


ROLLER BIT COMPANY

HOUSTON 1, TEXAS, U.S.A.

STATISTICS and

WEEKLY WELL COMPLETIONS . . . WEEK ENDED JANUARY 5, 1946

	Total of all wells					Cum. to date		Wildcat completions and discoveries					Cumulative total, 1946				
	Comp.	Oil	Gas	Dry	Footage	1946	1945	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	30	15	0	*15	44,386	30	32	0	0	0	0	0	0	0	0	0	0
Pennsylvania	73	36	4	†33	119,666	73	48	0	0	0	0	0	0	0	0	0	0
West Virginia	4	1	3	0	12,857	4	10	0	0	0	0	0	0	0	0	0	0
Ohio	14	2	8	4	34,559	14	16	0	0	1	2	3	0	0	1	2	3
Indiana	2	1	0	1	8,311	2	3	0	0	0	0	0	0	0	0	0	0
Kentucky	10	5	0	5	18,283	10	11	0	0	0	1	1	0	0	0	1	1
Illinois	30	17	0	13	73,133	30	37	0	0	0	6	6	0	0	0	6	6
Michigan	15	4	3	8	31,822	15	23	0	0	0	3	3	0	0	0	3	3
Kansas	53	29	9	15	175,310	53	25	0	0	0	7	7	0	0	0	7	7
Neb., Mo., Iowa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oklahoma	30	22	0	8	156,314	30	20	0	0	0	0	0	0	0	0	0	0
Texas	107	62	12	33	525,155	107	105	2	0	1	13	16	2	0	1	13	16
North Central	22	16	0	6	58,927	22	30	0	0	0	0	0	0	0	0	0	0
West	9	0	4	5	25,800	9	19	0	0	0	0	0	0	0	0	0	0
Panhandle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eastern	11	3	5	3	59,335	11	12	0	0	0	2	2	0	0	0	2	2
Gulf Coast	52	36	0	16	325,460	52	31	1	0	0	10	11	1	0	0	10	11
Southwest	13	7	3	3	55,633	13	13	1	0	1	1	3	1	0	1	1	3
Louisiana	7	7	0	0	49,095	7	16	0	0	0	0	0	0	0	0	0	0
Northern	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0
Southern	7	7	0	0	49,095	7	9	0	0	0	0	0	0	0	0	0	0
Arkansas	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0
Mississippi	6	5	0	1	34,248	6	0	0	0	0	1	1	0	0	0	1	1
Southeastern States	1	0	0	1	8,530	1	0	0	0	0	1	1	0	0	0	1	1
Montana	6	6	0	0	14,732	6	5	0	0	0	0	0	0	0	0	0	0
Wyoming	4	1	2	1	16,241	4	4	0	0	1	1	2	0	0	1	1	2
Colorado	2	1	0	1	11,063	2	1	0	0	0	1	1	0	0	0	1	1
New Mexico	4	3	0	1	19,383	4	5	0	0	0	0	0	0	0	0	0	0
California	36	29	3	4	165,109	36	48	0	0	0	0	0	0	0	0	0	0
Total United States	434	246	44	144	1,518,197	434	416	2	0	3	36	41	2	0	3	36	41
Total previous week	509	287	36	184	1,793,548	26,966	24,904	10	0	0	49	59	512	23	133	3,418	4,086
Total Jan. 6, 1945	416	229	30	157	1,410,355	416	326	9	0	1	56	66	9	0	1	56	66

Service wells included: *15, †32.

MARKET QUOTATIONS

(This service is abbreviated because most refinery products are selling at the Government's price ceilings. Quotations on other products than those shown here furnished on request. Quotations are f.o.b. plant in tank cars and in cents per gal.)

REFINERY GASOLINE

Octane (A.S.T.M.)	78-80†	73-75
Mid-Continent*	6.375-6.75	5.625-6.00
Gulf Coast	6.75	5.750
Northeast Coast		9.875
California		6.50-7.00

*Basic Oklahoma Group 3. †1939 C.F.R. (research method).

NATURAL GASOLINE

Grades:	28-70	18-55
Oklahoma (Group 3)	4.500	5.400
N. Texas (f.o.b. plant)	3.500	4.200
N. Louisiana (f.o.b. plant)	3.750	4.500
California	4.875	5.500

CRUDE-OIL PRICES

Representative posted schedules per bbl.

East Texas	$1.25
Conroe	1.43
Tepetate, Louisiana, avg. grav.	1.20
Illinois Basin	1.37
Pecos County, Texas	.95
Bradford, Pennsylvania	3.00
Van, Van Zandt County, Texas	1.09

Note: Exclusive of subsidy.

GRAVITY SCHEDULES

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity—	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast Texas	West Tex.*
18-18.9	$0.80	....	....	....
19-19.8	.84	....	$1.06	$0.70
20-20.9	.88	$0.85	1.08	.72
21-21.9	.92	.87	1.10	.74
22-22.9	.96	.89	1.12	.76
23-23.9	1.00	.91	1.14	.78
24-24.9	1.03	.93	1.16	.80
25-25.9	1.07	.95	1.18	.82
26-26.9	1.11	.97	1.20	.84
27-27.9	1.15	.99	1.22	.86
28-28.9	1.18	1.01	1.24	.88
29-29.9	1.20	1.03	1.26	.90
30-30.9	1.23	1.05	1.28	.92
31-31.9	....	1.07	1.30	.94
32-32.9	....	1.09	1.32	.96
33-33.9	....	1.11	1.34	.98
34-34.9	....	1.13	1.36	1.00
35-35.9	....	1.15	1.38	1.02
36-36.9	....	1.17	1.40	1.04
37-37.9	....	1.19	1.42	1.06
38-38.9	....	1.21	1.44	1.08
39-39.9	....	1.23	1.46	1.10
40 and above	....	1.25	1.48	1.12

*Includes Lea County, New Mexico.

A.P.I. REFINERY REPORT

Week ended December 29, 1945
(Figures in thousands of barrels)

	Dly. crude runs to stills	Stocks: Gasoline	Distillate	Residual
East Coast	774	20,145	11,753	6,850
Appalachian	149	4,175	746	463
Ill., Ind., Ky.	747	19,440	5,370	2,751
Okla., Kan., Mo.	394	8,536	2,124	1,086
Inland Texas	217	2,890	392	733
Tex. Gulf Coast	1,180	16,736	5,848	5,114
La. Gulf Coast	313	4,490	1,696	1,492
North La., Ark.	55	1,777	491	335
Rocky Mtn.	119	1,965	471	752
California	781	15,051	7,760	22,871
Total 12-29-45	4,729	95,205	36,651	42,447
Total 12-22-45	4,611	91,870	38,919	41,479
Total 12-30-44	4,828	86,849	38,715	56,934

CRUDE-OIL STOCKS

(Bureau of Mines Estimate)

Week ended:	Bbl. of crude*
December 22, 1945	220,288,000
December 15, 1945	219,518,000
December 23, 1944	222,575,000

*Excludes unrefinable Calif. stocks.

TRENDS

DAILY AVERAGE PRODUCTION FOR WEEK

	Jan. 5 crude oil	Bureau of Mines demand forecast	Dec. 29 crude oil
Alabama	650	400	700
Arkansas	76,550	76,000	76,650
California	845,250	832,000	840,250
Colorado	21,000	20,000	19,200
Eastern	53,950	63,200	56,050
Florida	100	100	100
Illinois	202,900	206,000	201,050
Indiana	13,900	13,000	13,200
Kansas	205,950	260,000	241,900
Kentucky	30,200	28,500	29,300
Louisiana	373,050	365,000	372,550
North Louisiana	77,750	.....	77,250
South Louisiana	295,300	.....	295,300
Michigan	45,250	46,000	44,700
Mississippi	54,500	48,000	53,950
Montana	22,050	21,000	22,950
Nebraska	750	800	750
New Mexico	98,100	98,000	101,950
Oklahoma	392,800	382,000	390,850
Texas	1,999,300	1,950,000	1,918,900
East Texas	320,000	.....	307,000
East Central Texas	139,800	.....	130,300
North Central Texas	152,800	.....	149,650
Texas Panhandle	81,000	.....	81,000
West Texas	489,400	.....	465,800
Southwest Texas	328,800	.....	314,550
Texas Gulf Coast	487,500	.....	470,600
Wyoming	84,250	90,000	83,850
Total United States	4,520,500	4,500,000	4,468,850

Change from previous week up 51,650

Total production January 1-January 5, 1946 ..... 31,643,500 bbl.

Same period last year ..... 23,386,750 bbl.

CRUDE-OIL STOCKS 220,288,000 bbl. as of Dec. 22—up 770,000 bbl. One year ago 222,575,000 bbl.

GASOLINE STOCKS 95,205,000 bbl. as of Dec. 29—up 3,335,000 bbl. One year ago 86,849,000 bbl.

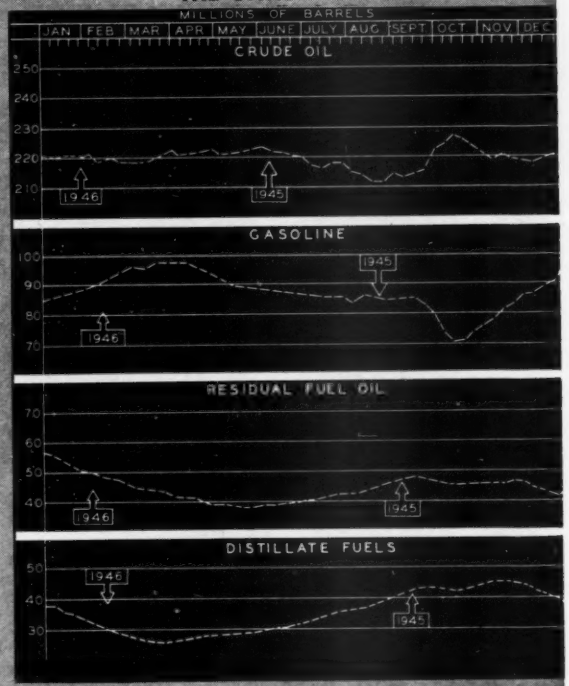
RESIDUAL FUEL-OIL STOCKS 42,447,000 bbl. as of Dec. 29—up 968,000 bbl. One year ago 56,934,000 bbl.

GAS OIL AND DISTILLATE STOCKS 36,651,000 bbl. as of Dec. 29—down 2,268,000 bbl. One year ago 38,715,000 bbl.

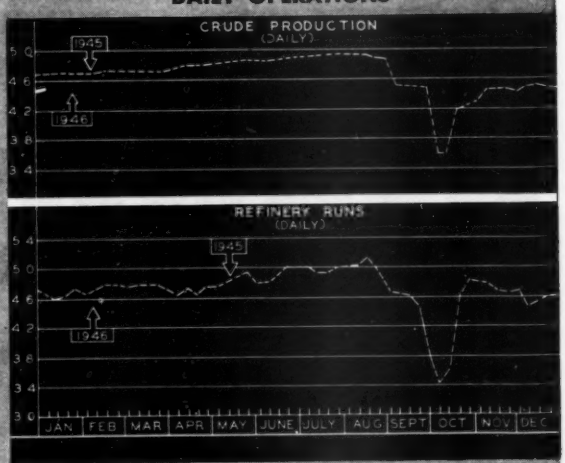
CRUDE-OIL PRODUCTION 4,520,500 bbl. as of Jan. 5—up 51,650 bbl. One year ago 4,677,350 bbl.

REFINERY RUNS 4,729,000 bbl. daily week ended Dec. 29—up 118,000 bbl. One year ago 4,828,000 bbl.

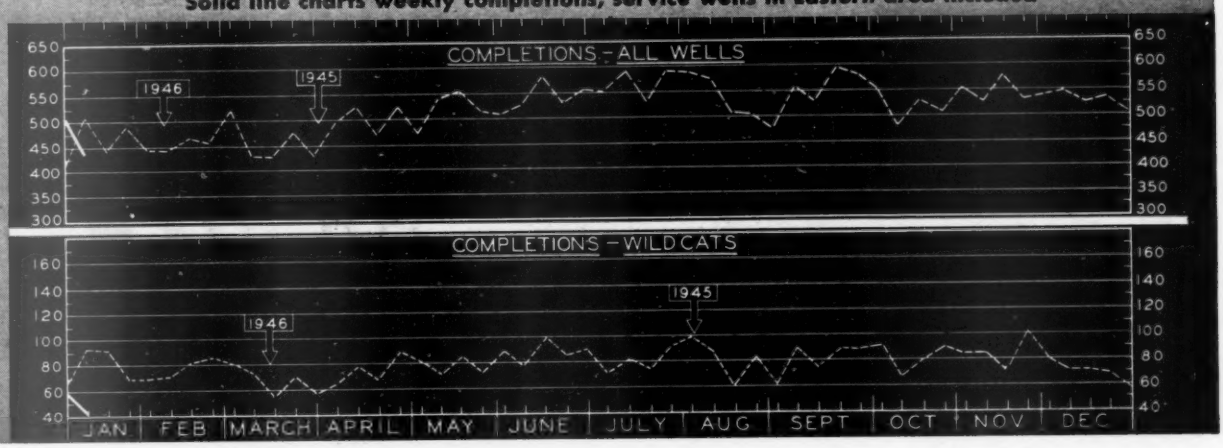
OIL STOCKS IN THE UNITED STATES

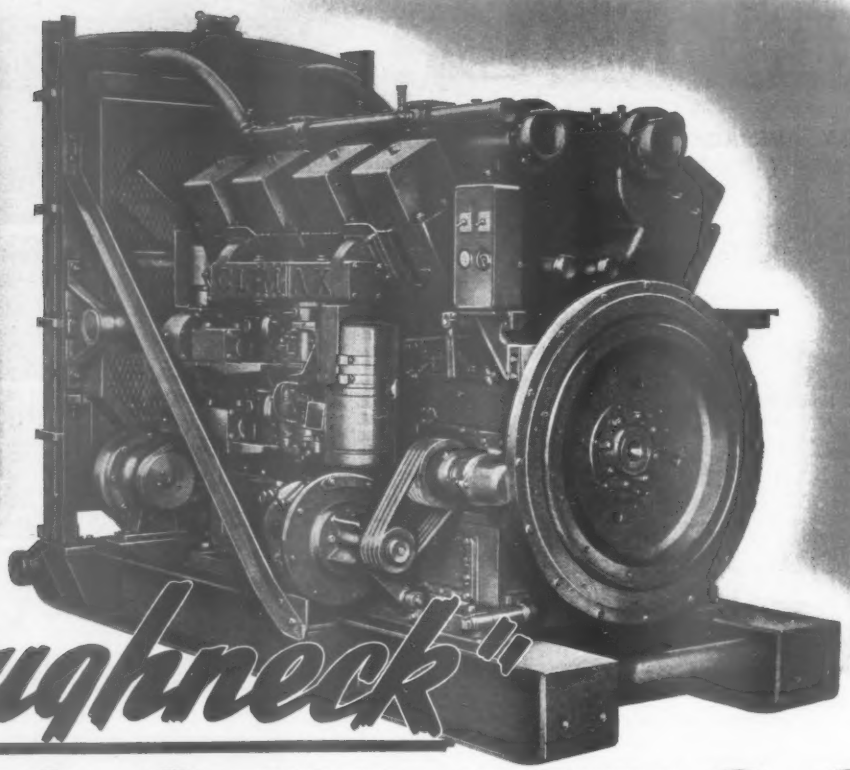


DAILY OPERATIONS



Solid line charts weekly completions, service wells in Eastern area included





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Exploration and Drilling

Week's Highlights

STEPPING out to define the limits of a newly discovered oil field often requires almost as much geological skill, plus a share of luck, as finding a new field. While the usual problem is one of interpreting the often meager data correctly so as to pin down the structural trap, geologists dealing with Rocky Mountain type geology, whether in the Rocky Mountains, or in the pre-Permian of West Texas, can testify that there are other problems just as difficult.

At Rangely, in Colorado, obviously a probable major caliber field, the Wasatch Refining Co.-Newton Oil Co. 2-D Gentry, CSL SW NE 3-1n-102W, looks like a ¾ mile south extension on the southeast end of the presently producing area. If it is, it will probably prove an additional 150 ft. of productive closure on the steeper dipping southwest flank of the structure; or maybe it will prove that much closure only on the southeast end of the producing area. It should produce, because wells higher on structure have penetrated more than enough producing formation without finding water to permit oil accumulation that low on the flanks.

So, the general structural control problems are geologically simple. But there are a few "ifs" in the picture. It has been delayed in completion since September by mechanical problems, and drilling water has stood on the sand for some time. It has been shot, and is cleaning out. If it proves a good well, then new problems arise. If it continues to have trouble, the question will be whether it was due to drilling water, or something else.

On the other hand, at Cat Creek, now having a new lease on life through the discovery of a deeper pay at about 1,400 ft., faulting is apparently resulting in some erratic conditions. The deep pay possibilities were thought to be condemned years ago by a 5,700-ft. dry hole less than ½ mile south of the well that recently found new production at 1,395 ft. This week two wells were completed: a 500-bbl. about ½ mile southeast of the deep discovery, and a dry hole, almost halfway between these two.

Important Developments

West Texas - New Mexico.—The T-X-L field, Ector County, has a 1-mile southeast extension of the Ellenburger in Texas Co. 1-D George C. Fraser, Section 27, Block 45, Township 1 south. The second Ellenburger producer in the Fullerton field of Andrews County, 2 miles east and 1 mile south of the discovery, was completed with a flow of 1,974 bbl. of 40.1° gravity oil in 24 hours. The south offset and second well in the Penrose Ellenburger field of Lea County, New Mexico, unloaded 50 ft. of drilling mud and 6,500 ft. of free oil, 37.5° gravity, on drill-stem test of the Ellenburger. This is in New Mexico's second Ellenburger pool, the first having been Humble's discovery of the Dublin pool last year.

California.—The Bandini area of the Los Angeles basin is still the hottest wildcat prospect in this district, despite the fact that no real discovery well has been completed, or even had a good drill-stem test. Richfield leading activity with 3 wildcats drilling simultaneously and location staked for a fourth.

EASTERN TEXAS

Magnolia Test in Marion County Being Deepened

DALLAS.—Magnolia Petroleum Co. 1 Orr, R. B. Fowler Survey, wildcat 3 miles southwest of Avinger, Marion County, was being deepened below 7,851 ft. after showing for a discovery in the Travis Peak. On a drill-stem test from 7,571-86 ft., 1,100 ft. of 39.4° gravity oil and 200 ft. of salt water were recovered when the tool was closed at the end of 25 minutes. The Travis Peak was entered at 7,528 ft. Elevation is 439 ft. Placid Oil Co. 1 Knox, Benjamin Parker Survey, which has shown for wet-gas production to extend the Whelan pool of northwestern Harrison County from 6,814-44 ft., was drilling below 8,070 ft. and will be taken to at least 8,200 ft.

Delta Drilling Co. 1 Livingston, Nacogdoches University Survey, wildcat 2 miles southeast of Reilly Springs in southern Hopkins County, was running survey at 8,633 ft. H. L. Hunt 1 Houston County Timber Co., W. M. Conner Survey, wildcat 6 miles east of Ratliff, Houston County, is dry at 8,195 ft. in Goodland lime. Sohio Petroleum Co. 1 Butler, Rains County wildcat 7 miles northeast of Emory, was fishing at 8,323 ft.

Carthage field, Panola County, reported five completions this week, and Hawkins field, Wood County, three. Hawkins field had four new locations.

WILDCAT FAILURES IN EASTERN TEXAS

Henderson County: Sohio Petroleum Co. 1 Bella M. Mandelstan, G. W. Baker Sur., 3 mi. E and slightly N Poyner, elev. 513 ft., Woobdine 5,072 ft., dry, TD 6,014 ft.

Rusk County: Standard of Texas 1 M. and R. Kangera, J. K. Campbell Sur., 5 mi. W Laneville, elev. 373 ft., dry, TD 4,140 ft.

PERMIAN BASIN

TXL-Ellenburger Pool Gets Southeast Extension

MIDLAND.—The Texas Co. 1-D George C. Fraser, Section 27, Block 45, T-1-S, T&P Survey, has assured a 1-mile southeast extension to the TXL-Ellenburger pool of western Ector County. On a 105-minute drill-stem test from 10,775-825 ft., using a 1,500-ft. water blanket, there was gas to the surface in 30 minutes. The well flowed water blanket in 55 minutes and oil in 70 minutes. During the last 30 minutes of the test, 44 bbl. of fluid was produced, 94 per cent being 40.3°-gravity oil and 6 per cent mud. Ellenburger was topped at 10,740 ft., approximately 1,160 ft. low to producers in the TXL-Ellenburger pool. Operator was drilling below 10,825 ft. in an effort to find additional pay in the Ellenburger zone. Stanolind Oil & Gas Co. 1 Jessie Mae Williamson, Section 5, Block 45, T-1-N, T&P Survey, wildcat northwest of the Goldsmith pool, Ector County, was deepening to the Ellenburger after finding water in the Silurian. The Silurian was topped at 8,555 ft. On a 3-hour drill-stem test from 8,887-9,004 ft., 990 ft. of drilling mud and 7,020 ft. of sulfur water was recovered.

Texas 29 W. E. Connell, Section 9, Block B-16, Public School Lands Survey, wildcat 1½ miles northwest of the Penwell (San Andres lime) field, Ector County, which encountered sulfur water in the Ellenburger in drilling to 9,675 ft., cemented 5½-in. casing near the bottom and was standing. It will drill out and test oil and gas shows in the top of the Ellenburger. If it fails to produce in this zone, operator may perforate and test higher formations. The Ellenburger was entered at 9,525 ft., 6,646 ft. below sea level. Cities Service Oil Co. 1 J. E. Parker, Section 20, Block 44, T-2-S, T&P Survey, scheduled 10,500-ft. wildcat 1½ miles west of the Harper pool, Ector County, was drilling below 8,717 ft. in lime, the identity of which was not given.

Mid-Continent Petroleum Corp. 3-11 University, Section 29, Block 13, University Lands, second Ellenburger discovery in the Fullerton area of northwestern Andrews County, has been completed to flow 1,974 bbl. of 40.1°-gravity oil in 24 hours. Production is through perforations from 10,580-630 ft. Gas-oil ratio was 314 to 1. Magnolia Petroleum Co. 1-A Cowden, Section 7, Block A-57, Public School Lands Survey, ¼ mile west offset to the discovery and only producer in the Dollar Hide pool of extreme southwestern Andrews, recovered 81 bbl. of new oil in 14 hours of natural testing through 246 perforations in 7-in. casing between 7,974-8,015 ft. Operator was testing after acidizing with 2,000 gal.

Seaboard Oil Co. 1 S. E. Lee, Section 47, Block 34, T-5-N, T&P Survey, eastern Dawson County pool opener 11 miles southeast of Lamesa, swabbed at the rate of 6 bbl. of fluid per hour for 12 hours, 94 per cent oil and 6 per cent acid water. The well has been treated with 3,000 and 6,000 gal.

of acid in oil-stained lime from 3,775-3,795 ft. in the San Andres. Moore Exploration Co. et al 1 Halff & Bivens, Section 65, Block 1, H&GN Survey, wildcat in western Crockett County, 2½ miles west and slightly south of the Noelke pool, ran a 3-hour drill-stem test from 7,375-7,512 ft. Recovery was 1,085 ft. of drilling mud cut with sulfur water. It has been shut down for orders.

McCulloch County reported four field completions this week. Garza field, Garza County, had three new locations.

SOUTHEASTERN NEW MEXICO

HOBBS.—Humble Oil & Refining Co. 8 Greenwood, 9-22s-37e, south offset to Neville G. Penrose, Inc. 1 Federal-Penrose, Lea County, opener of New Mexico's second Ellenburger pool, unloaded 50 ft. of drilling mud and 6,500 ft. of free oil testing 37.5° gravity when 15 stands of drill pipe were pulled following a 1-hour drill-stem test from 7,794-8,032 ft. in the Ellenburger. Gas came to the surface in 16 minutes and was gaged at a rate of 206,000 cu. ft. daily. The well was drilled to 8,032-75 ft., recovery was 94 ft. of drilling mud with no shows of oil or gas. The Ellenburger was topped at 7,998 ft., 4,580 ft. below sea level. Hole was being reamed to core ahead. Humble 1-B Federal-Leonard, Dublin area, 12-26s-37e, ½ mile north of 1 Federal-Leonard, first Ellenburger production in New Mexico, had reached 8,647 ft. in lime and shale.

Gulf Oil Corp. 1 Pike, 6-23s-38e, 2 miles south of Gulf 1 Drinkard, Clear Fork discovery, was completed to pump 60 bbl. of oil and 60 bbl. of fluid daily through casing perforations from 6,555-6,907 ft. The Texas Co. 2 Lockhart, 8-22s-38e, 2 miles north of Gulf 1 Drinkard, rated 65 bbl. of oil plus 2 per cent b.s. and w. for completion from acidized section from 5,560-10 ft.

The Drinkard area, Lea County, had two completions this week. The Empire field, Eddy County, and the Penrose-Skelly field, Lea County, each had one location.

N. CENTRAL TEXAS

Ellenburger Completion in Clay Flows 146 Bbl.

WICHITA FALLS.—Continental Oil Co. 1-C S. W. Heard, Ellenburger discovery 3 miles southeast of Joy, Clay County, has been completed to flow 146 bbl. of 41°-gravity oil in 3 hours through ½-in. choke on 2-in. tubing from 6,474-93 ft. Gas-oil ratio was 650 to 1. The Ellenburger was topped at 6,461 ft. Chalmette Petroleum Corp. 1-A C. A. Perry, Section 2165, TE&L Survey, wildcat 5 miles southwest of Elbert, Throckmorton County, is dry at 4,860 ft. There were some shows in the Caddo. It entered the Mississippian at 4,770 ft.

L. T. Burns 1-A C. F. Kunkel, Section 169, TE&L Survey, wildcat 2½ miles southwest of Olney, Young County, on first test since drilling plug from oil string flowed 140 bbl. in 1 hour through ½-in. choke and was shut in. Total depth is 4,890 ft. Mississippian was topped at 4,887 ft.

Continental 1 George Jarrell, Section 3433, TE&L Survey, Abstract 807, Montague County wildcat 5 miles southwest of Bowie, topped the Ellenburger at 6,690 ft. It drilled dolomite with slight show of oil from 6,813-35 ft. It is bottomed at 7,014 ft. where electrical log was run. The well is shut down for repairs.

Standard Oil Co. of Texas 2 Beasley, John McKerley Survey, Abstract 639, a scheduled 10,500-ft. test ½ mile west of Sivells Bend in Cooke County, was drilling below 7,916 ft. in lime. Standard 3 Beasley, in the same survey, found a slight show of oil from 4,807-23 ft. On a 15-minute drill-stem test 20 ft. of drilling mud was recovered.

Gatewood pool, Cooke County, reported three completions this week. Cooke and Wichita counties each had four new field locations.

In West Central Texas Reddin field, Taylor County, had four completions this week. Shackelford County has six field locations.

CALIFORNIA

Bandini District Continues To Hold Interest

LOS ANGELES.— The Bandini district of Los Angeles Basin continues to hold interest of producers as this area has shown more promise of yielding a new oil field than any of the other several wildcat districts that looked so good a few weeks ago. It will take another deep test at Gardena to determine the value of the oil sand found by Ohio Oil Co. and for this reason Gardena will be out of the picture for another several months. Bandini, on the other hand, may be proved up as a new oil field within the next few weeks provided Richfield's wildcat on the Simons property is located on structure or the semidiscovery well on the Union Pacific lease can be successfully plugged back and finished as a clean oil producer.

Richfield Oil Corp. with three wells already under way, has staked location for a fourth test to be drilled on the Keller lease north of the company's Union Pacific well. Richfield's geological department is apparently confident it has found the missing field in Los Angeles Basin between Santa Fe Springs and metropolitan Los Angeles. Other operators are also of the opinion that Richfield will have a new oil field as soon as present mechanical troubles have been remedied. There has not been any acreage available in the Bandini district for several months as Richfield appears to have practically all of the potentially productive acreage under lease.

Shell Oil Co., Inc., recently acquired the Pansini property from C. G. Willis as well as certain other leases somewhat removed from present work. When taking over the Pansini lease from Willis, Shell acquired a test drilled by Willis to 8,195 ft. with 7-in. casing landed on bottom.

In the Leffingwell district between Santa Fe Springs and West Coyote, Standard Oil Co. of California has abandoned the bottom of the hole in the Lewis wildcat and is at present testing some showings found above 10,000 ft. The wildcat is located in Section 11-3s-11w and is the deepest hole drilled in the immediate area. In Section 14-3s-11w, Standard has completed tentative plans to deepen an old abandoned test of the Wilshire Annex Oil Co. This wildcat was drilled to 9,034 ft. and abandoned in July 1941 as a duster. Although Standard has failed to develop commercial production at Leffingwell, the company's deep test showed too much to justify abandonment of the area.

Shell's wildcat east of the Dominguez field has not received much attention from prospectors but this well might bear watching in the future. The company found some interesting oil sand in this outpost about 2 weeks ago but when it failed to do much on a formation test, the company resumed drilling. Interest in this wildcat is that it is almost as far east of Dominguez as Ohio's Gardena wildcat was to the west and since Ohio found an oil sand in the west Shell might also find a deep sand to the east.

Development work continues to increase at Edison and in the Cymric section of the McKittrick field. Drilling can be expected to show a substantial increase in both districts although at Cymric, a sudden increase in water cut in Union Oil Co.'s 54-26 Anderson, a recent completion, is causing some concern.

Locations this week were somewhat lower than completions but this condition has prevailed for several weeks and is of no immediate concern as it reflects deeper drilling which keeps rigs working longer and thus decreases the number of wells which can be drilled in a given time.

SOUTHWEST TEXAS

Humble Opens Gas Pool In Atascosa County

CORPUS CHRISTI.—A new gas pool has been opened ¾ mile southwest of Jourdanton in Atascosa County by Humble Oil & Refining Co. 1 Henry Schorsch. Potential was 5,000,000 cu. ft. of gas per day on open flow, with 2,520 lb. tubing pressure on ⅛-in. choke. Total depth is 7,405 ft. and production is through perforations at 7,263-95 ft.

About 2 miles southwest of Tuleta in Bee County, Mills Bennett is opening gas-condensate production at his 1 Martha Berger et al, wildcat in J. M. Uranga grant, Section 19, Ragley Subdivision. Drilled to a depth of 8,100 ft., this test recovered 100 ft. of gas-cut mud with 10 gal. of condensate, no salt water, on a drill-stem test run in the open hole from 8,000 ft. to bottom, in the Luling sand section. A 2,000-ft. water cushion was used and test flowed the cushion in 8 minutes, showing a maximum working pressure of 950 lb. Bottom-hole pressure flowing was 4,599 lb. and shutin pressure was 5,075 lb. This wildcat had previously shown gas-condensate in the Slick zone on test at 7,896-7,905 ft. Operators plan to drill deeper.

A new oil sand in Willamar field, Willacy County, has been opened by Pan American Production Co. 3 G. C. Kent. Drilled to a total depth of 7,990 ft., this well was completed in the regular sand and a new sand at 5,286 ft. Through perforations at 5,286-88 ft. in new sand it flowed 79 bbl. of 35° gravity oil per day through ⅛-in. choke, no water, gas-oil ratio 1,911 to 1, tubing presure 100 lb., and through perforations at 7,900-65 ft. it made 80 bbl. per day on 10/64-in. choke, casing pressure 1,050 lb., gravity 31°, no water, gas-oil ratio 627 to 1. This is the first oil production from this 5,200-ft. sand.

The South Texas Geological Society reports the name "Berclair" has been given the field discovered by Magnolia Petroleum Co. 1 R. F. Irby in Joseph Callahan Survey, Goliad County. The society also advises that "Parson field" was recently named after completion of W. H. Holland 1 Garcia in Starr County; that the Railroad Commission and the operator have subsequently requested this area be designated as a part of the Rincon field.

There were 19 new locations this week, 3 being wildcats, 1 each in Bee, Live Oak and Nueces counties. Kleberg led with five locations, four of which are in Tijernia field and one in Canales field. Of the 46 completions 9 are wildcats, 3 successful, 1 a new gas-pool opener in Atascosa, and 2 new oil pays, 1 each in Duval and Willacy counties. The wildcat failures are two in Bee, two in Nueces, and one each in Jim Hogg and Jim Wells counties. Willamar field received the greatest activity with eight producers; Seeligson was next with five.

SUCCESSFUL WILDCATS IN SOUTHWEST TEXAS

Atascosa County: New gas pool—Humble 1 Henry Schorsch, Edward Estes sur., Atascosa Colony Farms Subd., Blk. 24, ¾ mi. SW of Jourdanton, TD 7,405 ft., perf. 191 holes 7,263-95 ft., PT 5,000,000 cu. ft. gas per day, open flow, TP 2,520 lb., on ⅛-in. choke.

Duval County: New oil pay, Piedras Pin-

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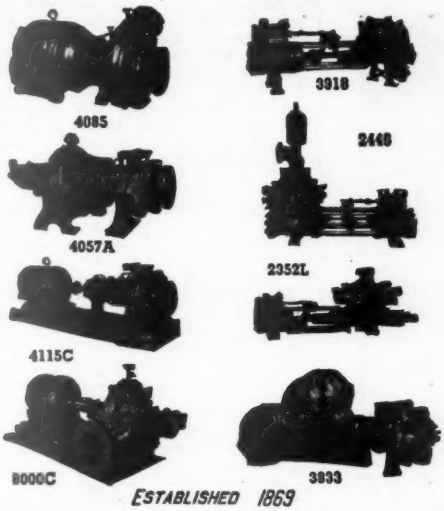

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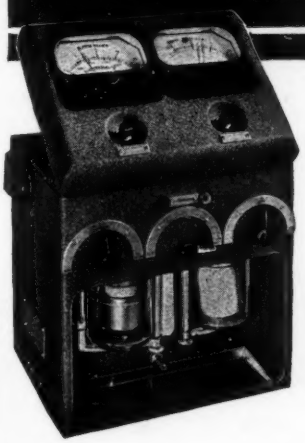

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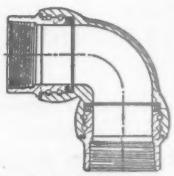

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tas field—H. H. Howell 1 George B. Parr, Sur. 185, 2 mi. E of Benavides, TD 5,595 ft., dual completion, perf. 3,798-3,804 ft., PT 246 bbl. per day through 3/16-in. choke, gas-oil ratio 381 to 1, CP 500 lb., grav. 44°, no water; through perfs. 3,990-4,008 ft., PT 271 bbl. per day through 3/16-in. choke, gas-oil ratio 348 to 1, TP 575 lb., grav. 49°, no water.

Willacy County: New oil pay, Willamar field—Pan American 3 G. C. Kent, San Juan De Carricitos Grant, Share 13, TD 7,990 ft., dual completion, perf. 7,902-65 ft., PT 80 bbl. per day through 10/64-in. choke, gas-oil ratio 627 to 1, CP 1,050 lb., grav. 31°, no water; top new sand 5,286 ft., perf. 5,286-88 ft., PT 79 bbl. per day through ⅛-in. choke, gas-oil ratio 1,911 to 1, CP 1,050 lb., grav. 35°, no water.

WILDCAT FAILURES IN SOUTHWEST TEXAS

Bee County: W. C. McBride, Inc. 2 L. N. Connally, C.C.D. Co. Sur., Abst. 360, 4½ mi. NE of Beeville, dry, TD 3,926 ft. W. C. McBride, Inc. 1 R. A. Hall, J. W. Cook Sur. 4, Abst. 449, 3¾ mi. NE of Beeville, dry, TD 4,158 ft.

Jim Hogg County: Miller Bros. & Bowling 1 J. M. Tygart et al, Sec. 23, Fowler & Rankin Subd. of El Sordo Grant, 15 mi. S of Hebbronville, dry, TD 4,151 ft.

Jim Wells County: Skinner & Eddy Corp. and Schmitz & White 1 Herbert Scheel, La Tinaja De Lira Grant, ½ mi. N of Alice, dry, TD 5,600 ft.

Nueces County: Hiawatha Oil & Gas Co. 1 Emmett Jones, Gregorio Farias Grant, Abst. 592, 1½ mi. NE of Robstown, dry, TD 7,511 ft.

Seaboard Oil Co. of Dela. 17 Clara Driscoll, Jose A. Cabasos Sur., Abst. 63, 2 mi. NW of Driscoll, dry, TD 7,512 ft.

SOUTH LOUISIANA

New Gas Discovery In Iberia Area

NEW ORLEANS.—A new gas discovery in the Iberia area of Iberia Parish is Humble Oil & Refining Co. 1 Mayo Romero, 2-12s-7e. Drilled to a depth of 11,330 ft., with 7-in. casing cemented at 11,327 ft., this well flowed on 24-hour test 1,070,000 cu. ft. of gas with 14 bbl. of 51°-gravity condensate through a 9/64-in. choke. Gas-condensate ratio is 75,400 to 1, with 3,700 lb. pressure on the tubing. Production is through 47 perforations at 11,010-015 ft. This company has moved in materials to drill its 2 Romero in the same area. Gas will be used from the discovery to drill this new test.

Magnolia Petroleum Co. 1 J. B. Morein, NW SW 5-5s-1e, 1½ miles northeast of Mamou townsite in Evangeline Parish, is a new oil pool opener in the parish. On production test the well flowed 703 bbl. of 46°-gravity oil through a ½-in. choke with a gas-oil ratio of 4,000 to 1. Tubing pressure 4,150 lb. Total depth is 11,653 ft. with 7-in. production pipe set on bottom, and perforations at 11,520-30 ft. in the Wilcox sand stratum. The well encountered a thick section of oil sand from 11,510-53 ft. Oil sand was found at 11,575 ft., with sand showing gas and condensate in the Cockfield which was topped at 8,940 ft. Magnolia has staked another location, 1 L. F. Duos, in the center of a 42-acre tract, approximately center of SE SW 6-5s-1e.

A new deep sand has been opened at Venice field in Plaquemines Parish by Tide Water Associated Oil Co. 28 Buras Levee District, 23-21s-30e. New sand was topped at 11,533 ft., and production is through perforations at 11,536-45 ft. On a 24-hour gage the well flowed 189 bbl. of

37°-gravity oil through a ⅛-in. choke, tubing pressure 1,875 lb., and gas-oil ratio 955 to 1. Oil showed 0.1 per cent water.

Ten new locations were reported this week including two wildcats in Cameron Parish. Napoleonville field in Assumption Parish received two locations, while Richie, Hayes, West Tepetate, La Pice, Port Barre, and Section 28 Dome each received one location. The seven completions for this week are all in proven areas with Vinton in Calcasieu Parish receiving three producers, Black Bayou, West Tepetate, La Pice, and St. Martinville each received one producer.

TEXAS GULF COAST

Spring Field Test Flows 65 Bbl.

HOUSTON.—On the west side of Spring field in Harris County, in Wiley Smith Survey, Abstract 706, Cheesman & Cranston 1 Mrs. L. V. Snyder, flowed a 24-hour gage of 65 bbl. of 39° gravity oil daily through a 6/64-in. choke, with tubing pressure 850 lb., and casing pressure 2,150 lb. Gas-oil ratio 1,144 to 1, no water in the flow. Production is through 12 perforations at 6,242-45 ft. Total depth 6,251 ft., with 5½-in. casing set at 6,251 ft.

At Tomball, also in Harris County, Humble Oil & Refining Co. 10 Edward F. Milo et al, Wilcox test, in C. N. Pillott Survey, Abstract 632, is reported swabbing, with no show of oil or gas, in perforations at 10,050-60 ft.

Deep test on the northwest flank of the old West Columbia dome, Brazoria County, on Lot 5 of the Wilson Subdivision in the Geo. Tennille Survey, Fidelity Oil & Royalty Co. et al 1 Wilson Unit, has been plugged as a dry hole with a total depth around 5,420 ft. No shows were encountered.

Humble has located two deep tests for the Danbury dome in Brazoria County. Its 1 W. L. Clayton et al will be a 10,000-ft. test in Henry Austin League 5, Abstract 13; and the 2 Emil Korenek et al, in the Mattie Shepard Survey, Abstract 668, is to be drilled to 9,000 ft.

West outpost test at Cedar Bayou, Chambers County, the J. Newton Rayzor et al 1 S. R. Williams, in S. Smith Survey, Abstract 69, is dry at a total depth of 7,503 ft., with no shows reported.

The Texas Co. 120-C Pierce Estates, between Lane City and Withers fields, in Wharton County, a half mile east of Withers production in Wm. Pettus League, is preparing to perforate for a production test. Total depth is 5,390 ft., and 5½-in. production pipe is cemented at 5,382 ft.

There were 20 new locations reported this week, including 6 wildcats, 2 each in Brazoria and Harris counties, and 1 each in Hardin and Jefferson counties. The 19 completions included 5 dry wildcats, 2 in Harris County, and 1 each in Chambers, Hardin, and Matagorda counties. Chambers County received five completions to take the lead, with Harris County next with four.

WILDCAT FAILURES IN UPPER GULF COAST TEXAS

Chambers County: Humble Co. 1-D State-Galveston Bay, Sec. 200, Smith Point area, dry, TD 11,742 ft.

Hardin County: Glenn H. McCarthy 1-A Grayburg Timber Co., South Lake area, HT&B Sur., Abst. 286, dry, TD 11,600 ft.

Harris County: J. S. Abercrombie Co. 1 Lenoir Josey, Inc., Cypress area, WCRR Sur., Abst. 914, dry, TD 7,376 ft.

H. C. Cockburn-O. W. Dyer and Otis W. Dyer, Jr. 1 E. L. and F. V. Bender Est., T. S. Roberts Sur., Abst. 659, 4 mi. E of Aldine, dry, TD 8,050 ft.

Matagorda County: Sun 1 Pierce Est., I&GN Sur. 6, Abst., 249, dry, TD 9,010 ft.

OHIO, KENTUCKY

Morgan County Gains Large Gas Well

COLUMBUS.—The second big gas well at Eaglesport in Bloom Township, Morgan County, was completed by Stephens Petroleum on Van Horn-Barr consolidation, Section 4, ½ mile northeast of their first well. Clinton sand at 4,409-42 ft. made 4,800,000 cu. ft. natural.

Hart and Hickman 1 J. Everette, Lot 6, a rank wildcat in Vernon Township, Trumbull County, has been drilled in with a good showing of light oil in the Oriskany sand. The well is now being cleaned out for further testing.

S. E. Large 1 A. E. Sandel, Lot 17, Monroe Township, Muskingum County, a wildcat, found the Clinton at 4,151-4,200 ft., with a show of both oil and gas. Well is to be shot and tested.

The most concentrated drilling in the state is now being done in and around the city of Canton in the Sandyville field. The number of drilling wells is now 19 and rigs have been built for an additional 3. Nine locations were reported this week. Of the 14 completions, Cambridge field led with 5.

OHIO SUCCESSFUL WILDCAT

Medina County, Hinckley Township.—William Dempsey 1 Ervin Wilkinson, Lot 2, Clinton 3,200-30 ft., 197,000 cu. ft., TD 3,255 ft.

OHIO WILDCAT FAILURES

Guernsey County, Washington Township—Ohio Fuel 1 L. W. Latham, Sec. 22, Berea 1,291-1,356 ft., TD 1,364 ft.

Perry County, Thorn Township—Zanesville

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T. & S. 1 Chas. Love, Sec. 31, Clinton 2,554-73 ft., TD 2,624 ft.

EASTERN KENTUCKY

ASHLAND.—Completion of one oil well and one dry hole marked activities in the Eastern Kentucky field of operations during the week.

Kentucky Oil Co. completed No. 4 on the William T. Smythe property in Lee County, Billy's Fork, 863 ft., dry.

Smith and Mays completed No. 3 on the Shelby Smythe property, Billy's Fork, Lee County, 833 ft., 5 bbl.

WESTERN KENTUCKY

OWENSVILLE.—About 1½ miles south of Henderson, Henderson County, Basin Drilling Co. have prospects of a new pay at their 1 Carl Smith, 9-P-23. A ½-hour drill-stem test on the Waltersburg sand at the 1 Smith got 50 ft. of free oil, the first sign of commercial sand production in this area. Other production is from the McClosky lime. This new well is 900 ft. east of Basin Drlg. Co.'s recent discovery, the 1 Kasey Club.

Producers Pipe Line Co. and Sohio 1 Cavender, 9-M-29, a McLean County wildcat which showed for a time as a prospective pool opener, has been completed as a dry hole. Saturation was found in the Penn. sand at 1,141-50 ft., but the well produced only 5 bbl. of oil per day on subsequent tests.

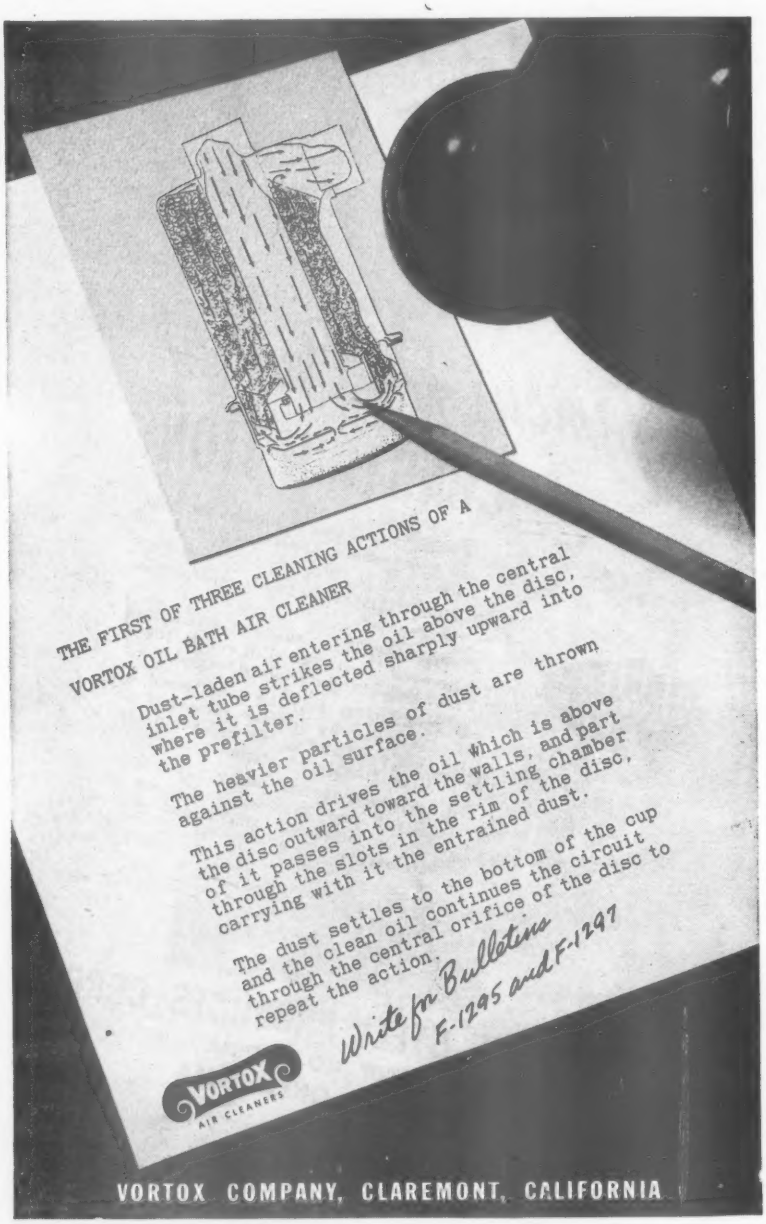
WESTERN KENTUCKY WILDCAT FAILURES

McLean County: Producers P. L. Co. & Sohio 1 Cavender, 9-M-29, elev. 435 ft., dry at 2,142 ft., Penn sand 1,141-50 ft. tested 5 bbl. oil per day, Viola 1,498-1,503 ft., Golconda 1,671-1,730 ft., Barlow 1,788-90 ft., Paint Creek 1,849-80 ft., Bethel 1,882 ft., St. Genevieve 1,946 ft.

INDIANA

EVANSVILLE.—The North Owensville field of Gibson County was extended slightly to the north during the past week by one of the largest wells completed in Indiana for several months. Superior Oil Co. 1 Armstrong-Spore, SW SE NW 19-2s-11w, was completed for 960 bbl. of oil daily from 2 ft. of McClosky lime saturation. The well was perforated with 10 shots from 2,265-67 ft. and treated with 2,000 gal. acid. It is about 4 miles north of Owensville and 6 miles southwest of Princeton. The 1 Armstrong-Spore has revived considerable interest in this area and 5 additional wells are under way at present with location staked for a sixth.

Only 2 completions were reported for the past week in Indiana, both in Gibson County. Of these, 1 was a small oil well and the other a dry hole. Drilling permits were issued for 10 new tests in 4 counties, Gibson County leading with 6 and followed by Posey County with 2 new tests. Permits were also issued for 1 test each in Daviess and Dubois counties.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ILLINOIS

New Field in Prospect For Clay County

MATTOON.—Clay County has prospects of a new oil field in the area about 6½ miles northeast of Louisville, where N. V. Duncan 1 J. Leonard, SW SE NE 2-4n-7e, is cleaning out and testing after a 60-qt. shot in the Cypress sand at 2,560-76 ft. The 1 Leonard was drilled to a total depth of 3,007 ft., but was plugged back to 2,577 ft. to test good saturation encountered in the Cypress when no shows were found in lower formations. It is 3 miles from nearest production in the Sailor Springs Consol. field.

Another Clay County prospect, W. W. Shaffer 1 Wood, SE SW SE 21-5n-6e, is on production test of the McClosky lime at 2,797-2,803 ft., total depth 2,804 ft. A 1-hour drill-stem test of the McClosky saturation shortly after it was drilled recovered 250 ft. of clean oil, 90 ft. of oil-cut mud and no water.

In Madison County, E. A. Obering 1 A. P. Mossiman, NW SE NW 28-5n-5w, is coring ahead in Detrital at 1,881 ft., after 5 attempts to take a drill-stem test of an oil show at 669-76 ft. The St. Genevieve was topped at 860 ft. and the Detrital at 1,877 ft. A White County wildcat, Pure Oil Co. 1 E. B. Munsey, NE NE NW 8-6s-9e, has been put on pump and is testing saturation found in the Hardinsburg sand at 2,621-61 ft., total depth 3,205 ft.

Thirty wells were completed in Illinois during the past week, 17 of these being oil wells and the remainder dry holes. Six wildcats were completed but all of these were dry. Drilling permits were issued for 31 new tests, the largest concentration of these being in the Mattoon field of Coles County, which has been the most active spot in the Illinois Basin for the past several months.

ILLINOIS WILDCAT FAILURES

Clay County: National Assoc. Pet. 1 H. G. Williams, SW NE SE 33-5n-5e, dry at 2,700 ft.

Coles County: Tom L. Smith 1 Leslie Dole, SE NE SW 7-11n-7e, elev. 667 ft., dry at 2,362 ft., Glen Dean 1,933 ft., Barlow 2,033-50 ft., Cypress sand 2,103-38 ft., 2,219-28 ft., Aux Vases 2,228-46 ft., St. Genevieve 2,286 ft.

Henry Gray 1 F. Dornblaser, NW SW SW 24-11n-7e, dry at 2,008 ft.

C. L. Withers 1 M. A. McDivitt, SE NE NE 15-12n-10e, dry at 1,184 ft.

Franklin County: Central Pipe Line 1 U. S. Coal & Coke, NE NE SE 11-6s-3e, elev. 400 ft., dry at 2,656 ft., Glen Dean 2,316 ft., Barlow 2,554-65 ft., Cypress 2,579 ft., Paint Creek 2,652 ft.

White County: J. J. Lynn 1 John Earhardt, E½ NE NE 12-5s-8e, elev. 403 ft., dry at 3,323 ft., Glen Dean 2,650 ft., Barlow 2,866-75 ft., St. Genevieve 3,320 ft.

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MICHIGAN

Activity Concentrated In Arenac County

SAGINAW.—January drilling activity in Michigan is concentrating generally in Arenac County, where all new production of importance has been developed in recent months. Latest completions throughout the state total 15, including another Deep River-Arenac well with daily potential topping 5,000 bbl.

Completions included three other small producers, three small-to-medium gas wells and eight dry holes, including three wildcat tests, one each in Arena, Kent and Osceola counties.

Of 16 new locations announced this week, 5 are for additional wells in the growing Deep River field, a sixth for adjacent Adams Township. Other locations include two each in Isabella, Bay and Mecosta, one each in Osceola, Montcalm, Kent and Ottawa counties.

The steady over-all production decline continued, the Michigan Oil and Gas Association now estimating it at an average of 45,600 bbl. a day.

First 1946 auction of oil and gas leases on state-owned lands is set for February 1 in Lansing. The state conservation department will offer leases on 20,000 acres in Lake, Midland, Clare, Gladwin, Arenac, Missaukee, and Allegan counties.

MICHIGAN WILDCAT COMPLETIONS

Arenac County, Arenac, Twp.: J. E. Bauer 1 Frank Dubiel, NE NW NW 30-19n-5e, dry in Dundee formation, TD 2,945 ft.

Kent County, Lowell Twp.: Carl E. Grimes 1 Glenn Yeiter, NE SE SW 19-6n-9w, dry in Traverse limestone, TD 2,225 ft.

Osceola County, Richmond Twp.: Ashby Drilling Co. 1 L. A. Senegalub et al, NW SE SE 19-17n-10w, dry, TD 1,415 ft.

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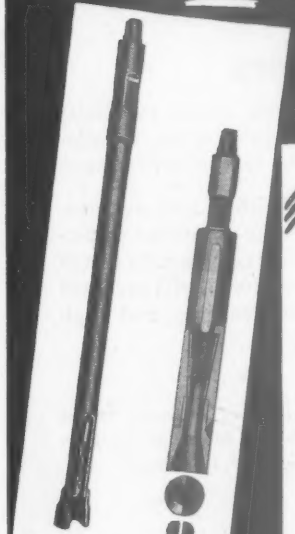

Fig. F533 Fig. F538

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(Fig. F533)

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CANADIAN FIELDS

Imperial Continuing Kinsella Field Development

CHATHAM.—In the Kinsella field, east of Edmonton, Imperial Oil is continuing development following completion of Imperial-Kinsella 2, LSD 11, 20-48-9w4, as a large gasser at 2,135 ft. Two additional tests are located, and two more locations being made.

Lloydminster.—In the Lloydminster field, eastern Alberta, S.A.C. (Alta) Oils 2, LSD 1, 12-49-1w4, finished at 1,874, is reported pumping 40 bbl. of 14°-gravity oil. The company is extending its drilling east and north in the direction of the Community Services producers in Saskatchewan, with two additional locations east of the provincial boundary. Of 22 wells drilled in the Lloydminster area in 1945, some 15 were oil producers and 2 gassers.

Ram River.—In the Ram River-Clearwater area of the Central Alberta foothills, Ram River Oils 3, LSD 12, 1-37-11w5, bottoming in Devonian limestone at 5,752 ft., is reaming and straightening following directional survey, and preparatory to testing production. Ram River 4, LSD 9, 36-34-10w5, has spudded.

Steveville.—In the Steveville field, eastern Alberta, P. S. & D. 1, LSD 2, 3-20-12w4, took drill-stem test at 3,402 ft. encountering considerable water and traces of gas. The hole is being deepened to test the Madison limestone.

Conrad-Taber.—A new area lying between the Conrad and Taber fields in southern Alberta is to be tested by a three-well program sponsored jointly by Lion Oils of Calgary and Shunda Oil Co. of Windsor. Shunda-Lion 1 has location in NW LSD 4, 23-7-15w4.

Alberta Dry Holes

Burdett: California - Standard Burdett-Province 3, LSD 9, 25-7-12w4, TD 3,062 ft., Madison limestone, dry.

Conrad: Conrad-Province 17-30-B, LSD 16, 30-5-15w4, TD 3,226 ft., dry.

Vale Dome: Martin 2, LSD 12, 9-42-6w4, TD 2,497 ft., dry.

APPALACHIAN FIELD

No New Locations; Important Tests Continue

PITTSBURGH.—Holiday shutdowns decreased completion totals in the lower eastern fields during the past week and no new locations were made. However, several important Oriskany tests which were drilling in the producing horizon continued work with the completion of one and good volumes in two others In Ravenswood district, Jackson County, West Virginia, United Carbon Co. completed a large gas well as a test 1,295 Elias Baiser with a final open flow of 13,027,000 cu. ft. of gas from the Oriskany sand. The Corniferous lime was topped at 4,694 ft., Oriskany 4,806 ft., rock pressure 1,420 lb. in 24 hours, total depth 4,822 ft.

In the same pool, Columbian Carbon Co. is drilling through the Oriskany in the test 825 G. S. Barnhart with the Oriskany topped at 4,860 ft. and gas gaging 6,367,000

cu. ft. at 4,686 ft. Here also, United Fuel Gas Co. is drilling in the Oriskany, topped at 4,960 ft. in the test 5,738 Miriam Hersman, with gas at 4,966-72 and 4,976-80 ft. and gaging 5,955,000 cu. ft. at 4,989 ft.

In Webster County, the wildcat of Tri-State Oil & Gas Co. on Hoover and Davis lease in Hacker Valley district, is shut down at 4,096 ft. with a show of gas in the Riley sand and about 20,000 cu. ft. of gas from the Benson sand (3,839-45 ft.) It has a rock pressure of 1,300 lb.

On Chestnut Ridge in Georges Township, Fayette County, southwest Pennsylvania, Manufacturers Light & Heat Co. shut down 6 Barton Heirs in the Onondaga chert at 7,265 ft. waiting for a gas line to be laid. At that depth, it had an open flow of 346,000 cu. ft. of gas and in 12 days had rocked up to 2,770 lb.

In Fairfield Township, Westmoreland County, Peoples Natural Gas Co. has reached 5,850 ft. in the Oriskany test on Camilla Giffin farm. In Unity Township, Railway Steel Spring Co. is casing at 1,563 ft. in its test on L. C. Steiner farm which is also scheduled for the Oriskany.

ROCKY MOUNTAIN

Cat Creek Repeats With a Producer

DENVER.—The Cat Creek field in Montana which furnished a surprise last October with the completion of Schock's 1 Fifer in the Ellis sand at 1,394 ft., flowing 300 bbl. per day, repeated last week in Spencer & Livingston 5-A O'Dea, NE NE SW 21-15n-30e, which flowed 500 bbl. overnight and at the end of the period was making 50 bbl. an hour natural. It was an old second Cat Creek sand well deepened from 968 to 1,379 ft., total depth. It had the top of the Ellis at 1,368 ft., and drilled 11 ft. into the pay. The 5½-in. casing was cemented at 1,310 ft., shutting off the water in the third Cat Creek sand. The field was down to an average of 300 bbl. per day after having produced more than 14,000,000 bbl. of light oil when the Fifer well discovered the new pay. Since then four more Ellis sand producers have been completed as flowing wells. These were around the discovery, but the O'Dea well is slightly more than ½ mile to the southeast. The crude is about 52° gravity.

Against the favorable results in the O'Dea well is a disappointment in Ralph Chamberlin 1 Charles, NE SW NW 21, midway between the discovery and the latest completion. It had the top of the Ellis at 1,443 ft., and was drilled to 1,447 ft., and at last report was swabbing only water. The supposition is that a fault lies between this well and the producers. This appears to be borne out by a deep test drilled by California Co. in 1941 in C SE NW, 21, between the O'Dea and Charles wells, which went to 5,705 ft. and stopped in the Cambrian. It had only a show of the Ellis.

Oregon Basin wildcat still testing.—Pacific Western Oil Co.-Kirk Oil Co. 5 Connaghan, SW SW SE 29-51n-100w, deep test in the Oregon Basin field which for several weeks has shown indications of a discovery in a sand in the Cambrian, perforated the 5½-in. casing with 11 shots at 6,300-04 ft. After running tubing, the fluid rose 1,300 ft. in 8 hours, and it swabbed 12 to 15 bbl. of water per hour for 16 hours, no oil showjng. Swabbing continued and on the last gage it was showing a slight scum of oil. Perforations at 6,341-46 lb., which yielded water, were squeezed off. Top of the most promising saturation was at 5,960 ft. Testing is continuing.

Gas well at Beaver Creek.—Stanolind Oil & Gas Co. 2 Beaver Creek, near C NW SW 11-33n-96w, Beaver Creek structure, Fremont County, Wyoming, was completed at 8,108 ft. n shale and tested 8,100,000 cu. ft. of gas with well open 2½ hours. It had the top of the Lakota at 8,043 ft., and the 7-in. casing was cemented at 8,046 ft. Before casing off the Frontier sands, a drill-stem test at 7,077-107 ft., open 40 minutes, recovered 10,000,000 cu. ft. of gas and 10 gal. of distillate in the basal sand of that series. The well is located ¾ mile southeast of 1 Government, a 1938 discovery in the Morrison sand, which made 9,000,000 cu. ft. on final test through perforations at 8,230-50 ft., after finding water in the Nuggett or basal Sundance at a total depth of 8,920 ft. The second well did not go to the Sundance.

Flowing well at Table Mesa.—The first well drilled in the Table Mesa field, San Juan County, New Mexico, since 1939 was completed in Continental Oil Co. 13 Table Mesa, SW NE 3-27n-17w, as a flowing well in the Dakota at 1,335 ft., total depth, for 30 bbl. per day, 1 ft. in the sand. A peculiar feature of the completion is that it is a close offset to No. 12, completed in 1939 for 1 bbl. of oil and 169 bbl. of water per day. Upon completion of the water well the field production jumped 10 bbl. per day.

Circle Ridge deep test.—Continental Oil Co. 4 Shoshone, C NW SW 6-6n-2w, intended as a test of formations below the Tensleep, developed a crooked hole and was completed at 715 ft. in the Tensleep for 100 bbl. per day and rig was skidded to the northeast for 5 Shoshone in NE NW SW of the same section to test the lower horizons. It is being drilled with cable tools.

Rangely field extension.—Wasatch Refining Co.-Newton Oil Co. 2-D Gentry, CSL SW NE 3-1n-102w, ¾ mile south of Texas Co. 1-34 Carney, the nearest producer looks as though it will be an important extension on the south. It reached a total depth of 6,379 ft. early last September, but

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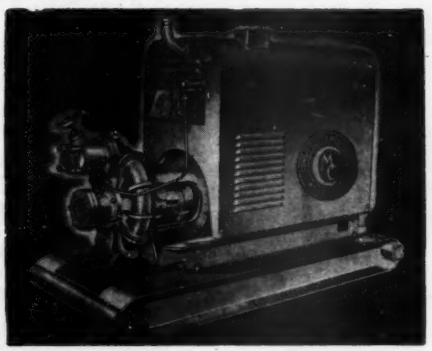

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has been delayed by mechanical difficulties, and it probably will be a month before it is officially gaged. It flowed 324 bbl. in 24 hours after a heavy shot and prior to cleaning out. Drilling water has stood on the sand for some time. Quantity of oil has increased while cleaning out is in progress.

Johnston wildcat near objective.—Frontier Refining Co. 1 Hankins, C NE SE 22-5n-67w, Weld County, Colorado, is drilling at 7,873 ft. in hard shale close to the top of the Dakota, and is through the Muddy sand. It will go to the Lakota.

Neiber Dome wildcat hits gas.— G. & G. Drilling Co. 1 Government, Lot 8, Section 19-45n-92w, California Co. and Parker Drilling Co. joint operation, Neiber Dome, Washakie County, Wyoming, struck a flow of gas in a sand in the Cody shale at 5,347 ft., total depth. Gas caught fire and burned rig to the ground. Two days later it was smothered out by a cavein. Hole is reported to be in good condition and new rig will be built and 10,000-ft. test to the Tensleep will be continued. Estimated flow of gas was 20,000,000 cu. ft.

Ohio in Hamilton field.—The Secretary of the Interior has approved the acquisition by Ohio Oil Co. of a 25 per cent working interest in approximately 800 acres in the Hamilton field in Wyoming. Argo Oil Corp. owns 50 per cent interest and is the operator. The remaining 25 per cent interest is held by Empire State Oil Co.

New operations.—Four new operations were reported, including the skidded rig of Continental Oil Co. deep test at Circle Ridge. The most important of the new locations is Stanolind Oil & Gas Co. 22 Iles Unit, SW SW SE 22-4n-92w, Iles Dome, Moffat County, a wildcat which will go to the Weber, the producing horizon at Rangely. It is joint with Texas Co. Iles, has never been tested below the Sundance, the major producing horizon. The others are one each by Stanolind in Little Buffalo Basin and Continental in Lance Creek.

Completions.—Thirteen wells were completed in the Rocky Mountain area of which nine were oil wells with initial production of 1,786 bbl., two were gas wells and two were dry holes. These were distributed: Colorado, one oil well for 326 bbl. in Rangely and one dry hole, a wildcat in the old Boulder field; Wyoming, four completions, of which one was a 100-bbl. well at Circle Ridge; two were gas wells at Beaver Creek and Middle Baxter Basin, and one was a dry hole; Beaver Creek and the dry hole at East Lance Creek were wildcats. Montana had six completions, all oil wells, with initial of 1,330 bbl., of which one was in Cat Creek, four in Cut Bank, and one in Kevin-Sunburst. Northwest New Mexico, one 30-bbl. well at Table Mesa.

COLORADO WILDCAT FAILURE

Boulder, Boulder County: Oriental Refining 1 Gallagher, NW NE SW 9-1n-70w, TD 4,641 ft., top of Muddy 4,640 ft., show of oil, dry.

WYOMING SUCCESSFUL WILDCAT

Beaver Creek, Fremont County: Stanolind Oil & Gas 2 Beaver Creek, NW NW SW 11-33n-96w, TD 8,108 ft., top of Lakota 8,043 ft., 7-in. 8,046 ft., tested 8,100,000 cu. ft. well open 2½ hours.

WYOMING WILDCAT FAILURE

East Lance Creek, Niobrara County: Trigood Oil 1 Mills, SW SE 21-36n-64w, TD 3,940 ft., dry in Dakota.

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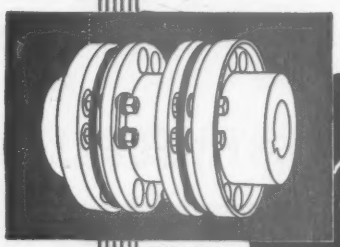

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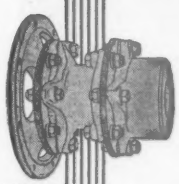

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KANSAS

Phillips County Test Logs Several Oil Pays

HELMERICH & PAYNE, INC., 1 Bowman "A," NW NW SE 3-5-20w, Phillips County wildcat, had a good drill-stem test in the Lansing at 3,150-3,200 ft., and has logged several pays in the Arbuckle, topped at 3,372 ft. Pays in the Arbuckle are designated at 3,381-87 ft., 3,391-93 ft., and 3,398-3,404 ft. Five and one-half-inch pipe has been set on bottom, and operators are preparing to test.

Ellsworth County: West of the Vacek pool. Bridgeport Oil Co. 1 Zvolenak "B," SW SW SE 29-15-10w, swabbed 60 bbl. of oil in a two-hour test from the Arbuckle.

Ness County: Sohio Petroleum Co. 2 Drake, NE NW 27-16-25w, has been completed as the second dry hole in the Arnold pool. It is an east offset to the 1 Drake, completed for a potential of 458 bbl. The Arnold pool now has three Mississippi lime producers and two dry holes.

Rice County: Lauck-Moncrief 1 Logan, SE SW SE 12-20-10w, wildcat, is building tanks in preparation for testing. After drilling plug at a total depth of 3,294 ft., 1,500 ft. of oil rose in the hole. The well is about 1 mile west of the South Chase pool.

Sedgwick County: Beech Aircraft Co. 1 McLean, NW SE NW 1-27-1e, drilled to total depth 3,001 ft., perforated 2,075-77 ft., and produced an estimated 75 bbl. per day. Operators plan to plug back.

Trego County: Sohio Petroleum Co. 1 Schaefer, NE NE NW 11-12-21w, wildcat, is preparing to drill plug. The Arbuckle was topped at 3,964 ft., and fair porosity and saturation logged gives prospects of a producing well.

Completions for the week totaled 53, including 29 oilers, 9 gas wells, and 15 dry holes. The Chase pool came into the limelight this week, adding nine new oil wells. The Hugoton field also had nine completions, all gas wells.

KANSAS WILDCAT FAILURES

Barton County: Fred Manning 1 Dirks, SW

SW SW 6-20-14w, dry, TD 3,664 ft., Arbuckle 3,612 ft.

Harper County: Lion 1 Leeper, NW SE NE 15-31-8w, dry, TD 4,397 ft., Mississippi lime 4,380 ft.

Rice County: Phil Han 1 Brownlee, NE SE NW 1-18-9w, dry, TD 3,284 ft., Arbuckle 3,264 ft.

Chalmette Petroleum 1 Bolton "A," SE SE NE 10-19-8w, dry, TD 3,300 ft., Arbuckle 3,206 ft.

Rooks County: Veeder Supply et al 1 Fleming, SE SE SE 29-6-19w, dry, TD 3,665 ft., Arbuckle 3,627 ft.

Stafford County: W. L. Hartman et al 1 Hiss, NE NE SW 12-21-14w, dry, TD 3,679 ft., Arbuckle 3,675 ft.

Ed Swearer et al 1 Tuckwood, NW NW SE 24-23-12w, dry, TD 3,871 ft., Arbuckle 3,851 ft.

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MISSISSIPPI

Adams County Gets Year's First Discovery

JACKSON.—Roeser & Pendleton and Sohio Petroleum Co. 1 Baker-Maier, 34-6n-2w, Adams County, will be the first discovery for 1946 in Mississippi. Previously the well had shown oil in the Wilcox, but had not tested there, planning to drill to the Massive before final testing. Massive sand was cut at 10,530 ft., and casing was perforated at 10,542-52 ft., with 60 shots. A drill-stem test taken with packer at 10,504 ft. flowed water cushion in 19 minutes, and at the end of 41 minutes had built up pressure of 1,000 lb. while continuing to unload water cushion. The well flowed light green oil, 45 gravity or higher, but no gage was taken. If this test continues to look favorable, the Wilcox may not be tested.

Another Adams County wildcat has prospects of opening a new field. Phillips Petroleum Co. 1 Davey, 46-8n-2w, cored in basal Tuscaloosa sand, topped at approximately 10,055 ft. Operators are now drilling below 10,121 ft.

Completions for the week totaled six, including five oil wells in proven locations, and one dry wildcat. The new oilers were scattered through Eucutta, Flora, Gwinville, East Heidelberg, and Langsdale fields. Only one new location has been announced, a wildcat to be drilled in Tippah County.

MISSISSIPPI WILDCAT FAILURE

Smith County: Gulf Refining 1 Foley, SE NW 8-10n-13w, dry, TD 6,332 ft., Tuscaloosa 5,538 ft.

ALABAMA WILDCAT FAILURE

Mobile County: Danciger Oil & Refining 1 Giesler, NE SW 8-4s-2w, dry, TD 8,530 ft.

LA.-ARK.

Lamar Parish Well Flows 145 Bbl. Per Day

SHREVEPORT.—Atlas Oil & Refining Co. and C. W. Sharp 2 Baker, SW SE 27-16n-9e, Lamar field discovery, is producing oil from the Tuscaloosa sand. The well was drilled to 4,940 ft., and flowed 145 bbl. of oil per day through a 3/16-in. choke, with production coming from 4,874-79 ft.

Bossier Parish: Big West Drilling Co. 1 Continental-American Bank & Trust Co., SW NE 23-19n-11w, in the Bellevue field, may open a deeper pay for that field. Operators drilled to 5,925 ft., set casing at 4,760 ft., and will test a sand at 4,684-4,715 ft.

Natchitoches Parish: Mike T. Halbouty 1 Detro, 1-13n-8w, a wildcat in the Ashland area, is preparing to perforate opposite the Woodbine at 3,285-96 ft., after receiving a good drill-stem test last week.

In the Arkansas fields, Fouke field added a new oiler, but wet weather is delaying most operations. Eight tests in the Gum Creek field of Ouachita County are slowed up or stopped because of water over the area. In the Village field, Columbia County, McAlester Fuel Co. 1 Threadgill unit, NE SW 10-17s-19w, has been completed with initial production of 113 bbl. per day.

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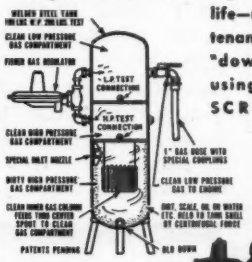

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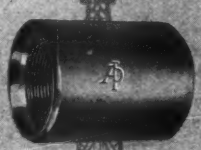

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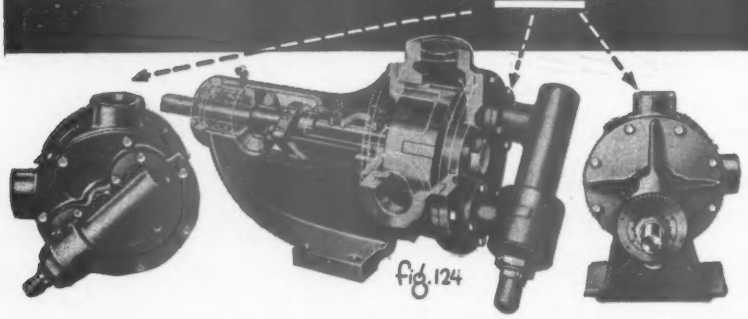

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OKLAHOMA

Seminole County May Gain New Cromwell Sand Field

GLOBE OIL AND REFINING CO., which has helped uncover some of the new reserves of Garvin County and other areas of Oklahoma, now has a prospective Cromwell sand discovery southeast of the Cheyarha pool in Seminole County. Globe's 1 Davis and Patterson, SW SW NW 22-9n-7e, topped the Cromwell sand at 3,425 ft. and cored to 3,450 ft. A drill-stem test at this depth showed gas in 9 minutes and a steady spray of oil in 30 minutes. Gas was estimated at 3,500,000 to 4,000,000 cu. ft. When test ended, 10 ft. of free oil were recovered from the tester. The well is now shut down and operators are preparing to run 7-in. casing to the top of the Cromwell. The East Seminole pool to the west of the new discovery also produces from the Cromwell sand.

Scribner, Beebe and Wise 1 Tom Smith, SW NE NE 23-12n-10e, has extended the new Booch sand area of eastern Okfuskee County about ⅛ mile to the north with the successful testing of the Booch at 2,580-2,600 ft. The well started off at 6 bbl. of oil an hour and flow increased until it was producing at the rate of 106 bbl. a day along with an estimated 4,000,000 cu. ft. of gas. A test by the same operators, located about 20 acres to the south, was reported drilling at about 2,300 ft. and going to the Wilcox sand.

At the close of the week, Skelly Oil Co. was waiting on cement at its prospective northwest extension well to the West Moore pool of Cleveland County, 1 Ernest Divis in SE SE NW 30-10n-3w. No. 1 Divis topped the Wilcox sand at 8,782 ft. and drilled to a total depth of 8,859 ft., but was plugged back to 8,825 ft. Casing was perforated at 8,802-04 ft. and the well produced salt water along with oil on subsequent tests. Tubing has been run to squeeze off the perforations before additional testing is undertaken.

Water level has been definitely determined in Carter Oil Co.'s McClain County wildcat, 1 C. W. Mottinger, NW NW NW 5-6n-3w. A 2-hour drill-stem test at 11,053-11,230 ft., present total depth, recovered 65 stands of salt water along with load water, oil and gas-cut mud and white sand. The well previously had flowed oil on drill-stem tests between 10,785 and 10,883 ft. However, Carter has been drilling ahead slowly for about 3 weeks seeking information on the deep structure.

Four new wildcat tests were announced during the past week to get Oklahoma's 1946 exploration program under way. These include Cities Service 1 Hoffman, SW SE NW 21-3n-1w, 3 miles east of that company's recent Antioch discovery in western Garvin County; Continental 1 Bonner, SE SE SW 18-3s-2w, 2 miles west of the Wheeler field in Carter County; R. R. Crawford and G. H. Blankenship 1 Murphy, SW SE NE 24-15n-5e, 2¼ miles north of production in the north extension of the Davenport pool; and R. H. Pierce 1 Hertz, SW SW SE 7-15n-5e, 1½ miles west of Kendrick.

Bethlehem to Operate Corsicana Facilities

Bethlehem Supply Co., Tulsa, will hereafter operate the plant and business of American Well & Prospecting Co., Corsicana, as a part of the parent company, according to G. A. Tompson, vice president of Bethlehem. The American Well & Prospecting Co. was purchased by Bethlehem in July 1944. I. C. Smith is plant manager at Corsicana.

Permissive Unitization of Oil And Gas Pools Urged

AUSTIN. — Laws for permissive unitization of oil and gas pools should be recommended to the Texas legislature by the State Railroad Commission, an advisory committee of the commission says in its report on an engineering survey of casinghead-gas waste.

The committee, headed by James P. Nash, of Austin, has been working with the engineering committee, headed by William Murray, Jr., of Houston. The engineering committee recently reported that some 1,500,000,000 cu. ft. of casinghead gas produced with oil is lost in Texas daily.

Lack of unified control over production and reinjection of casinghead gas was cited by the engineers as a handicap to conservation in many oil fields.

The committee asked the commission to recommend legislation for the following:

1. Permissive pooling of oil and gas properties, including those owned by the state and other government subdivisions.

2. Permission for such agreements to be approved by the Railroad Commission, after hearing, rather than by the attorney general.

3. A requirement for the commission to include merchantable casinghead reasonably accessible to market in allocating gas production to meet market demand.

4. Amendments to clarify and restrict the use of gas in gas-lift apparatus.

The committee said the commission should urge Congress to amend the Natural Gas Act to provide that no federal agency may regulate production, gathering, or compressing gas nor regulate the field price for it. Federal Power Commission is to hold a hearing on natural gas in Houston, January 28, part of a nation-wide investigation which some Texas operators view as a prelude to efforts to extend federal authority over oil and gas.

The committee also recommended that the commission make changes in rules:

1. Liberalized permission for allowables to be transferred from high gas-oil ratio wells to lower ratio wells.

2. A series of individual field hearings to determine how conservation may be practiced best, to be followed by appropriate orders.

The committee said oil operators should take steps to reduce gas-oil ratios and the volume of casinghead gas used for gas lift. It recommended cooperation among all operators to establish field-wide conservation and to use casinghead where possible for secondary-recovery operations. Where such gas is not needed for reinjection it should be marketed, a goal for which purchasing companies also should strive, the committee said.

Regarding the proposed unitization law, the committee said:

"When anyone considers true conservation in Texas, he is confronted at the outset with the proposition that the legislature has not yet enacted a law sanctioning the voluntary pooling of properties in the interest of conservation, except to a modified extent with respect to gas. The permissive statute as it relates to gas requires the approval of the attorney general of Texas and does not apply to certain state-owned lands, particularly lands owned by the University of Texas."

The committee asserted that pooling of certain gas fields is permitted by law, and should be extended on a permissive basis to oil properties also.

Annual Meeting of W.P.R.A To Be Held in Fort Worth

Fort Worth has been selected for the annual meeting of Western Petroleum Refiners Association, to be held March 25-27. The Blackstone Hotel will be headquarters. Plans for an interesting and helpful program are being laid.

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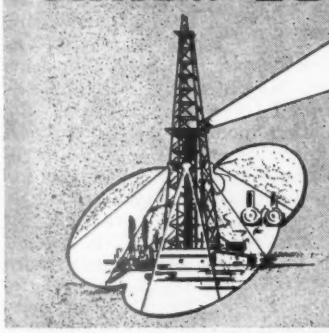

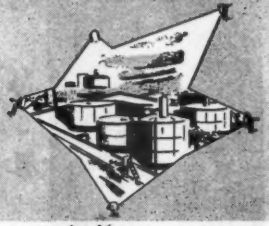

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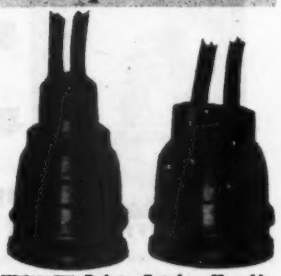

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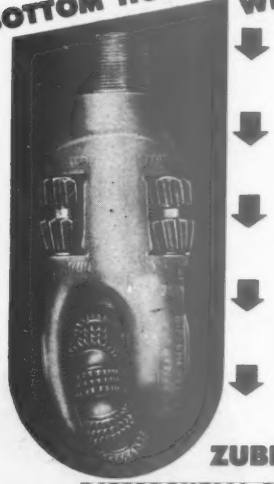

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Among the Drilling Contractors

George & Wrather, Mount Carmel, Ill., will drill two tests for Cherry & Kidd in Gibson County, Indiana. They are 2 Woodson, NE SW NW 19-2s-11w, and 3 Woodson, SW SW NW 19-2s-11w.

E. F. Moran, Tulsa, is the contractor for Continental Oil Co. 74 Maier, NW NW SW 12-3s-14w, Gibson County, Indiana.

Northern Development Co. of Edmonton has contract for S.A.C. Oils 3 and 4, to be drilled immediately, to test areas south and east of the new Lloydminster pool opened by the Lloyd Clinch interests. S.A.C. is in LSD 13, 2-49-28w3, and S.A.C. 4 in LSD 16, 3-49-38w3, both in the Saskatchewan or eastern end of the field.

Thorne Drilling Co., Henderson, Ky., has the contract for Calstar Peroleum Co. 1 Blake, 22-P-20, in Union County, Kentucky.

Union Rotary & Co. will drill Union Drilling & Producing Co. 1 Simpson, SE NW SE 16-16n-4w, in the Vernon field of Isabella County, Michigan.

C. B. Hall & Co., Washington, Ind., will drill R. F. Brown 1-A Bourkman, 165 ft. from the south line and 701 ft. from the east line of SE SE 15-3s-3w, Dubois County, Indiana.

George & Wrather, Mount Carmel, Ill., is the contractor for Black Hawk Coal Corp. et al 1 McMickle, 582 ft. from the north line and 990 ft. from the west line of NW NE 27-1s-12w, in Gibson County, Indiana.

Gordon Oil Co. is the contractor for Smith Petroleum Co. 1 Gardner & Williams Gas unit, NW 16-16n-7w, in the Fork field of Mecosta County, Michigan.

Hyslop & O'Neal, Francisco, Ind., will drill J. C. Haynes 1 Warnock, 330 ft. from the north and east lines of NE SE 6-2s-10w, in Gibson County, Indiana.

Crawford Drilling Co. is the contractor for Gulf Refining Co. 1 Langley, 554 ft. south and 560 ft. east of NW corner of NE NW 11-9n-9w, in the Eucutta field of Wayne County, Mississippi.

Lohman Construction Co., Evansville, Ind., has the contract for Clarence Wood 1 Hardiman, 1,077 ft. from the south line and 990 ft. from the west line of SW NE 27-1s-12w, in Gibson County, Indiana.

E. F. Moran, Tulsa, will drill Sinclair-Wyoming Oil Co. 10 Elliott, 880 ft. from the south line and 300 ft. from the west line of SW SW 14-5s-14w, in Posey County, Indiana.

Anderson Sells His Interest In Anderson-Prichard

OKLAHOMA CITY.—J. Steve Anderson has sold to an unidentified syndicate in Chicago his entire interest in Anderson-Prichard Oil Corp., ending a partnership which for a quarter-century has figured actively in oil operations of the Southwest. Besides a half interest in Anderson-Prichard Refining Co., Anderson-Prichard Pipe Line Co. and in Anderson-Prichard holdings in Col-Tex Refining Co., the transaction includes the Apco Tower, second highest office building in Oklahoma City. The consideration involved was not made public.

J. S. ANDERSON

Anderson was vice president of Anderson-Prichard Oil Corp. Except for his leaving the organization there will be no change, it was said, in the official setup, L. H. Prichard continuing as president.

Anderson, who had been a small

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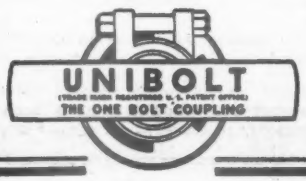

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independent operator, joined Prichard, an attorney, in 1909 to form the corporation. Previous to the sale, no one outside the families of the two men has held any financial interest in what has been rated "one of the nation's largest independent operators."

Anderson, as a young man in Chicago, started out to be a lawyer, but went to Oklahoma in 1906, got into the real estate business, and when the spectacular Cushing oil boom started 7 years later he became a wildcat operator and from that time devoted virtually his whole attention to petroleum.

CALENDAR

January

SAE, annual meeting, Book-Cadillac Hotel, Detroit, January 7-11.

FPC regional hearing in natural-gas investigation, Court House Building, Houston, January 28.

Independent Natural Gas Association of America, annual membership meeting, Texas State Hotel, Houston, January 28.

February

American Welding Society, national meeting, Hotel Cleveland, Cleveland, February 4-7.

Iron and Steel and Institute of Metals divisions, American Institute of Mining and Metallurgical Engineers, national meeting, Statler Hotel, Cleveland, February 4-8.

American Society for Metals, annual convention (postponed from 1945), Statler Hotel, Cleveland, February 4-8.

FPC regional hearing in natural-gas investigation, Buena Vista Hotel, Biloxi, Miss., February 11.

FPC regional hearing in natural-gas investigation, Chicago, February 19.

American Society for Testing Materials, spring meeting, Pittsburgh, February 25-March 1.

Exposition of Chemical Industries, twentieth exposition, Grand Central Palace, New York, February 25-March 2.

March

FPC regional hearing in natural-gas investigation, Charleston, W. Va., March 19.

Southern Gas Association, annual convention, Galveston, March 21-22.

Western Petroleum Refiners Association, annual meeting, Blackstone Hotel, Fort Worth, March 25-27.

April

American Association of Petroleum Geologists, annual meeting, Stevens Hotel, Chicago, April 2-4.

Natural Gasoline Association of America, annual convention, Baker Hotel, Dallas, April 17-19.

National Petroleum Association, semiannual meeting, Hotel Cleveland, Cleveland, Ohio, April 18-19.

May

Natural Gas Department, American Gas Association, annual spring meeting, Hotel Gibson, Cincinnati, May 7-8.

National Association of Corrosion Engineers, annual meeting, President Hotel, Kansas City, Mo., May 7-9.

June

American Society for Testing Materials, annual meeting, Buffalo, June 24-28.

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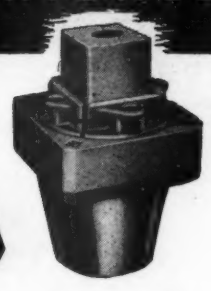

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J A. "CHUB" TRAUGHBER, production superintendent of the Transwestern Oil Co. in Oklahoma, Kansas, and Illinois, maintains his headquarters at Oklahoma City. He was born in Moline, Kans., and after attending public schools there, he joined the S.A.T.C. unit at the University of Kansas during World War 1.

As he obtained oil-field experience in 1919 in the Keystone area near Mannford, Okla., he became affiliated with the drilling industry after leaving the University of Kansas in December 1918. After spending 13 years as a tool dresser and driller, he joined the production department of the Slick-Urschel Oil Co. in the Oklahoma City field in 1932.

In 1934 when the Carter Oil Co. purchased Slick-Urschel properties in the Oklahoma City field he carried on his duties as tool pusher for Carter. He rejoined Slick-Urschel in 1935 as a farm boss. In 1937 he was promoted to superintendent of production for the Oklahoma City properties.

After organization of the Transwestern Oil Co., which absorbed Slick-Urschel properties, he was promoted to his present position on December 1, 1938. Over 250 wells on 75 leases are under his supervision. Kansas producing properties were transferred to his supervision on October 1, 1941. He is married and has two sons, one in the Marine Corps and one a student in an Oklahoma City high school.

Dr. Lester L. Hirst, Pittsburgh, has been appointed acting chief of a new hydrogenation demonstration plant which the Bureau of Mines will establish at the Missouri Ordnance Works near Louisiana, Mo. Dr. Hirst was a pioneer in American research on synthetic liquid fuels. Other appointments to the hydrogenation plant staff include **D. S. Taylor,** Otis, Kans., chief of plant maintenance, and **J. A. Markovits,** Pittsburgh, second assistant to Dr. Hirst.

Lt. Comdr. John E. Huff, Jr., is now on terminal leave at his home in Houston. His service in the Navy was with the Petroleum Inspection Department, under the Bureau of Ships, and he served in Talara, Peru, and the Persian Gulf areas as well as points in the United States. During 1945 he was in charge of petroleum inspection and tanker shipments at Abadan, Iran, and Bahrein Island. Previous to the war, Huff was engaged in several phases of the petroleum industry's operations.

John F. Seal and **C. Francis Beatty** have been named to the board of directors of Socony-Vacuum Oil Co. Seal, assistant treasurer since 1931,

J. F. SEAL

C. F. BEATTY

will become treasurer, succeeding **Arthur T. Roberts,** who retired December 31. Beatty, until recently president of Socony Paint Products Co., will be active in the parent company's marketing operations. Socony-Vacuum simultaneously announced that **Walter L. Faust,** vice president in charge of eastern marketing since 1938, will direct activities of the merged eastern and central marketing divisions. Central marketing operations formerly were supervised by **Charles E. Arnott,** who retired. Beatty will be associated with Faust in operations of the newly-combined marketing areas.

Addison B. Manning and **Howard J. Speer,** both geologists in the Rocky Mountain division of The Bay Petroleum Corp., and **Reuben D. Stroh,** assistant chief clerk in the company's general offices in Denver, have returned to their posts following discharge from military service. Manning, a Liberator pilot, with the rank of captain, has the Distinguished Flying Cross for his part in the raid on the Harbourg oil refinery and received also the Air Medal. Speer, a master sergeant in the Engineers Corps, was cited for his work in surveying and structural designing. Stroh, a corporal in the Ninety-eighth Infantry, participated in the bloody Battle of the Belgian Bulge.

Hugh O'Keefe, formerly assistant chief geologist for Phillips Petroleum Co. at Bartlesville, Okla., is now head of the geological and land department of Davon Oil Co., Oklahoma City.

R. H. Alagood, who maintained offices in Corpus Christi during the past 7 years, has been made district manager of new land and geological offices opened by Sunray Oil Corp. in San Antonio.

T. S. Johnston has been made manager of the marine department of Imperial Oil, Ltd., and The International Petroleum Co., Ltd., succeeding **Henry J. Rahives,** who retired. Johnston joined the department last February as assistant manager after 18 years in the oil business, including work in the Dutch West Indies and South America.

Errol J. Gay, motor-fuel and automotive technician with Ethyl Corp. and for 4 years consultant to the War Department, has been awarded the Exceptional Civilian Service Award, highest decoration given civilians by the War Department. Gay is cited for "his outstanding contribution to the Army Service Forces in standardizing petroleum products and containers for overseas operations."

Wayne Ashmore, geologist for the past 3 years in the Midland, Tex., office of Magnolia Petroleum Co., has been transferred to Jackson, Miss.

J. P. Jones, of Bradford, director of production for Pennsylvania Grade Crude Oil Association, has been appointed to the sanitary water committee of Pennsylvania State Chamber of Commerce. He will represent

the oil industry's producing division in the committee, which is to study ways of reducing pollution of Pennsylvania's streams.

Dr. Ben H. Parker, of Golden, Colo., for the past 2 years vice president of Frontier Refining Co., has been named president of Colorado School of Mines to succeed **Dr. M. F. Coolbaugh,** who retired. Dr. Parker was formerly a member of the faculty of the school, from which he graduated with an engineering degree in 1924. He received the doctor of science degree there in 1934. From 1924 to 1931 he served as a petroleum geologist for Marland Oil Co., Gulf Oil Corp., and E. W. Marland, Inc.

Lt. Comdr. Sherman A. Wengerd, back from overseas service, has rejoined Shell Oil Co., Inc., as a geologist in the Mid-Continent area, with headquarters in Wichita Falls, Tex.

C. M. Vardeman, district superintendent for Humble Oil & Refining Co. in the Talco, Tex., district, has been transferred to the Stratton district, Kingsville, Tex. **V. O. Harris** was promoted to the Talco district superintendency to succeed Vardaman. **Henry W. Robertson,** formerly assistant district superintendent at Pickton, Tex., was promoted to district superintendent at Navarro Crossing. **James H. Galloway,** back from military service, was transferred from the Kelsey district, Santa Elena, Tex., to the Sullivan district, Encino, Tex., as district superintendent. **Oliver L. Furse,** district petroleum engineer in the Hobbs, N. M., district, was transferred to the Pickton, Tex., district as assistant district superintendent. **Don F. Shaw,** district petroleum engineer in the Government Wells district, Freer, Tex., was transferred to the Flour Bluff district, Corpus Christi. He recently was discharged from military service. **Tom E. Beaird, Jr.,** who was petroleum engineer in the East Texas division office, Tyler, was transferred to the Navarro Crossing district, with promotion to district petroleum engineer. Promoted to district civil engineer were **John S. Hacker,** North Crowley district, Crowley, La.; **Bailey S. Hyden,** Lovell Lake district, Beaumont, Tex., and **William E. Neill,** Paradis, La., district. **Charles E. Ullrich,** civil engineer at the Katy, Tex., gas plant, was transferred to the North Bay district as district civil engineer. **William A. Castille** was appointed assistant division civil engineer for the Louisiana division, at New Orleans. **Harold M. Davidson** was promoted from assistant district chief clerk at Talco to district chief clerk at Navarro Crossing. **Murray A. Cunningham,** who was on military leave, is back in his former post as district civil engineer in the Natchez, Miss., district.

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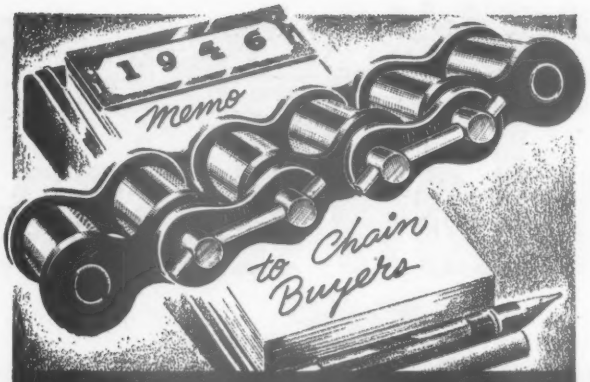

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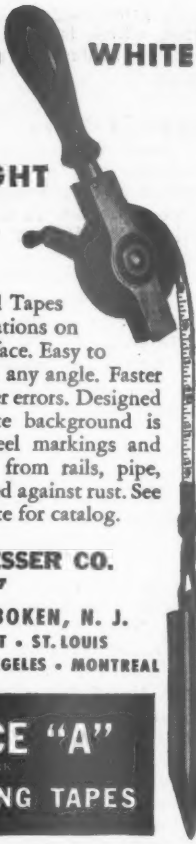

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Equipment Men in News

East Texas Electric Steel Co., Longview, Tex., announces appointment of **Allyn W. Hale** as foundry products engineer and sales manager. Hale will office at 709 Sterling Building, Houston, Tex. A native of St. Paul, Minn., Hale attended Oklahoma University and received his engineering degree in 1937. He joined Hughes Tool Co. as sales engineer of the foundry and held that position until his recent appointment with East Texas Electric Steel this month.

Comdr. Burt Powell, former news editor of Caterpillar Tractor Co., has returned to the company as a member of the sales department following 4½ years of service in the U. S. Navy, it was announced by **H. H. Howard,** general sales manager.

Emsco Derrick & Equipment Co. announces the formation of a new research department to be devoted exclusively to the development of new products. The new department will be headed by **G. R. Tremolada,** chief research engineer, who has been with Emsco since 1926. Born in Milan, Italy, he is a graduate of the Institute of Mechanical Technology, Santa Barbara Oriana, of Milan. After graduating, he was appointed designer-engineer at the Isotta-Fraschini plant. Later he functioned as chief engineer for Bianchi-Canions Co. He then joined the Shibler (now Mulag) Co. in Aachen, Germany, as consultant engineer, and acted in the same capacity at the Minerva Motor Car Works in Antwerp, Belgium. In 1917 Tremolada was affiliated with the Northwest Motor Co. in Detroit, and the Pontiac plant. He then transferred to the General Motors research laboratory in Dayton, where the development of the Whirlwind motor was under his direction.

Change in name of Association of Gas Appliance and Equipment Manufacturers to Gas Appliance Manufacturers Association is announced by **H. Leigh Whitelaw,** managing director. Functions of the association will in no way be altered. The change of name is for the purpose of simplification only. **Harold Massey** has been appointed assistant managing director of the association.

Irving F. Wagner, manager of American Brake Shoe's Kellogg plant at Rochester, N. Y., has been made a vice president of the Kellogg division. Wagner has been associated with Brake Shoe since 1923, and during the war was contracts officer.

R. O. Branyon will represent **Falcon Products, Inc.,** in the Los Angeles Basin and coastal areas. Branyon has just returned from more than 3 years in the Army Air Force.

Wagner Electric Corp. announces the retirement on December 31 of **V. W. Bergenthal** as executive officer of the company. Bergenthal, who will continue to serve as a director, has been with Wagner for 41 years. In 1913 he was appointed purchasing agent and served in that capacity until 1922. In January 1922 he was elected a director, and in August 1922 he was elected treasurer.

J. M. Taylor, until recently in charge of American Iron & Machine Works Co., Dallas office, has been made Gulf Coast district manager for that firm and will headquarter at the division office and warehouse at 2205 Quitman Street in Houston. **Bryan Curtis,** for the past few years ensign in the Maritime Service, has returned to duty with the American Iron & Machine Works Co. and will be sales representative in Houston territory.

W. S. Mounce, formerly senior metallurgist with the Hamilton Standard Propellers Division, United Aircraft Corp., in East Hartford, Conn., has joined the development and research division of The International Nickel Co., Inc. He will make his headquarters at the New England Technical Section of the division at 75 Pearl Street, Hartford, Conn., of which **D. A. Nemser** is manager.

L. C. Boos has been elected president of United States Rubber Export Co., Ltd., and **Herbert G. Kieswetter** has been elected vice president. Boos, formerly vice president of the export company, will continue as general manager and Kieswetter will continue as assistant general manager.

H. H. Kumler Co. has been formed, with offices at 319 Castle Building, Tulsa, Okla., to represent several manufacturers of oil equipment. These include Tool Steel Gear & Pinion Co. of Cincinnati (slush pump liners); Reliance Electric & Engineering Co.; Clark Controller & Manufacturing Co.; Cleveland Worm & Gear Co., and Farval Corp.

R. B. Rogers, London manager for The National Supply Corp., has recently spent several weeks in the United States, during which he has visited the company's manufacturing plants and a number of the oil fields, with the object of becoming familiar with the latest designs of equipment and modern field practices.

Lt. Col. Jim Cowan, after 5 years with the U. S. Army Air Forces, has returned to his old job in the sales department of Cameron Iron Works in Houston.

Stanley H. Atkinson, vice president of MacClatchie Manufacturing Co., who is making a several weeks tour of the Rocky Mountain fields, reports that his company's plant at Compton, Calif., is now enlarging its rubber department by the addition of two new steam molding presses, a large collender, a Stewart & Bolling mixing mill, and other equipment for the compounding and curing of rubber and synthetics.

Oscar H. D. Rohwer, vice president of Universal Atlas Cement Co., Chicago, United States Steel Corp. subsidiary, retired on December 31, 1945. He has been succeeded as head of the western region by **Fred T. Wiggins,** former sales manager, Birmingham, and more recently assistant to vice president, New York, who has been elected vice president, western region, Chicago.

Three generations of Axelson's today are active in the business of Axelson Manufacturing Co., Los Angeles, Calif., and another Axelson, **Stephen Charles,** 18 months old, already is a small familiar figure about the plant. Recently, four Axelson generations met in the company's offices and a picture was taken in the office of **Vice President Delbert F. Axelson.** Delbert's brother, **J. C. Axelson,** is president of Axelson. The picture honors one of the brothers, **Charles F. Axelson,** who came to California from Topeka, Kans., in the early nineties and in 1892, with his brother **Gustavus,** founded their first California venture, Acme Iron Works at Santa Ana. In 1895 the firm moved to Los Angeles. Today Charles F. Axelson, now 81, is still active in the business although his sons, **Jule** and **Delbert,** and his grandson, **Jack** have taken over business responsibilities that are shared, in various activities of the family, while Charles' brother, Gustavus, the other founder of the firm, also is still on the job in the executive offices as chairman of the board. During the war the firm won four stars on its "E" flag. In the picture are Jack Axelson and son, Stephen Charles, his father Delbert Axelson, and Charles F. Axelson, father of Delbert.

B. W. STEVENS

LEROY KRAMER

C. H. WAGNER, JR.

Web Wilson Oil Tools announces the appointment of **B. W. "Steve" Stevens** as agent for West Texas, Texas Panhandle, and New Mexico territories. His mailing address is P. O. Box 1507, Midland, Tex. Stevens will carry a complete stock of Web Wilson tools, including spare and replacement parts, Odessa, Tex.

LeRoy Kramer, first vice president of General American Transportation Corp., and an officer of that company for over 20 years, has retired from active service. He has agreed to act in an advisory capacity as vice president—retired. He will keep his office at the headquarters of the company, 135 South LaSalle Street, Chicago.

C. H. Wagner, Jr., secretary of Parker Appliance Co., has been elected vice president of the company, according to **S. B. Taylor,** president of the company.

American Well & Prospecting Co., Corsicana, Tex., has been acquired by Bethlehem Supply Co., Tulsa, Okla., according to statement by **G. A. Tompson,** vice president. **I. C. Smith** is manager of the Corsicana plant, which hereafter will be operated as a part of Bethlehem Supply Co.

J. E. Hilditch has been appointed representative for oil-industry sales by Tom P. McDermott, Inc., distributor for Dayton tires.

Helicoid Gage Division of American Chain & Cable Co., Inc., has been moved from Long Island City, N. Y., to Bridgeport, Conn., where the sales, engineering and manufacturing departments will be located at 929 Connecticut Avenue.

Rodpak Manufacturing Co., San Francisco, Calif., makers of patented floating seal metallic packings, has established an office in Los Angeles. **Charlton R. Gulick** is in charge of this new direct sales office, located at 745 South Central Aenue. The company also announces the appointment of **David G. Shipley** as production manager for the San Francisco plant. Shipley cames to Rodpak from Bethlehem Steel Co., where he was assistant superintendent of the submarine repair base.

John S. Lawrence has been appointed district sales manager of the Denver branch, mechanical goods division, United States Rubber Co., according to an announcement by **H. A. Everlien,** general sales manager of the division.

Ralph A. Powers has been named engineer in charge of electronic engineering at the Allis-Chalmers Manufacturing Co., according to **R. S. Fleshiem,** manager of the firm's electrical department.

United Oilwell Service, S. A., of Caracas, Venezuela, announces the organization of a service company which will offer to the petroleum industry of Venezuela many of the services currently being performed by Dowell Incorporated of Tulsa, Okla. The first service which will be offered in Venezuela is the acidizing of oil wells. Laboratory tests indicate that very useful results may be obtained through the use of acid in improving the producing characteristics of wells in many of the Venezuelan fields. In the past this procedure has been tried to a limited extent in Venezuela, but the handling of acid in large quantities encountered transportation difficulties which prevented wide application. These difficulties have now been overcome, and arrangements have been made to ship the necessary quantities of acid to Venezuela.

The principal base of operations will be at Km. 100 on the Barcelona-San Tome Road, at which point United Oilwell Service is constructing a modern camp, laboratory, warehouse and shops, as well as storage facilities for acid. The procedure for acidizing oil wells will be carried out under a licensing agreement between United Oilwell Service, S.A., and The Dow Chemical Co.

As soon as possible, United Oilwell Service plans to expand its services to include the use of plastics in water shutoffs, the use of the Dowell Electric Pilot for determining relative permeabilities in oil wells, water locating apparatus, and mud engineering. Plans are also being made for the extension of these services to the Maracaibo area. The general offices of United Oilwell Service, S.A., are located in Caracas, and **Charles W. Fowler** is president and general manager of the organization.

Phil J. Lehnhard, formerly of Dowell Incorporated, is chief engineer.

Oliver United Filters, Inc., announces the appointment of Western Machinery Co., S.A., Mexico, D.F., as its agents in Mexico and Central America particularly in connection with sales of filters, pumps and accessories to the chemical and metallurgical industries.

United States Steel Supply Co., subsidiary of United States Steel Corp., soon will begin construction of new steel warehousing buildings in Cleveland. The company has just acquired a 9-acre industrial tract on Bessemer Avenue in southeast Cleveland for its new structures which will be more than double existing facilities that are to be abandoned upon completion of the postwar development.

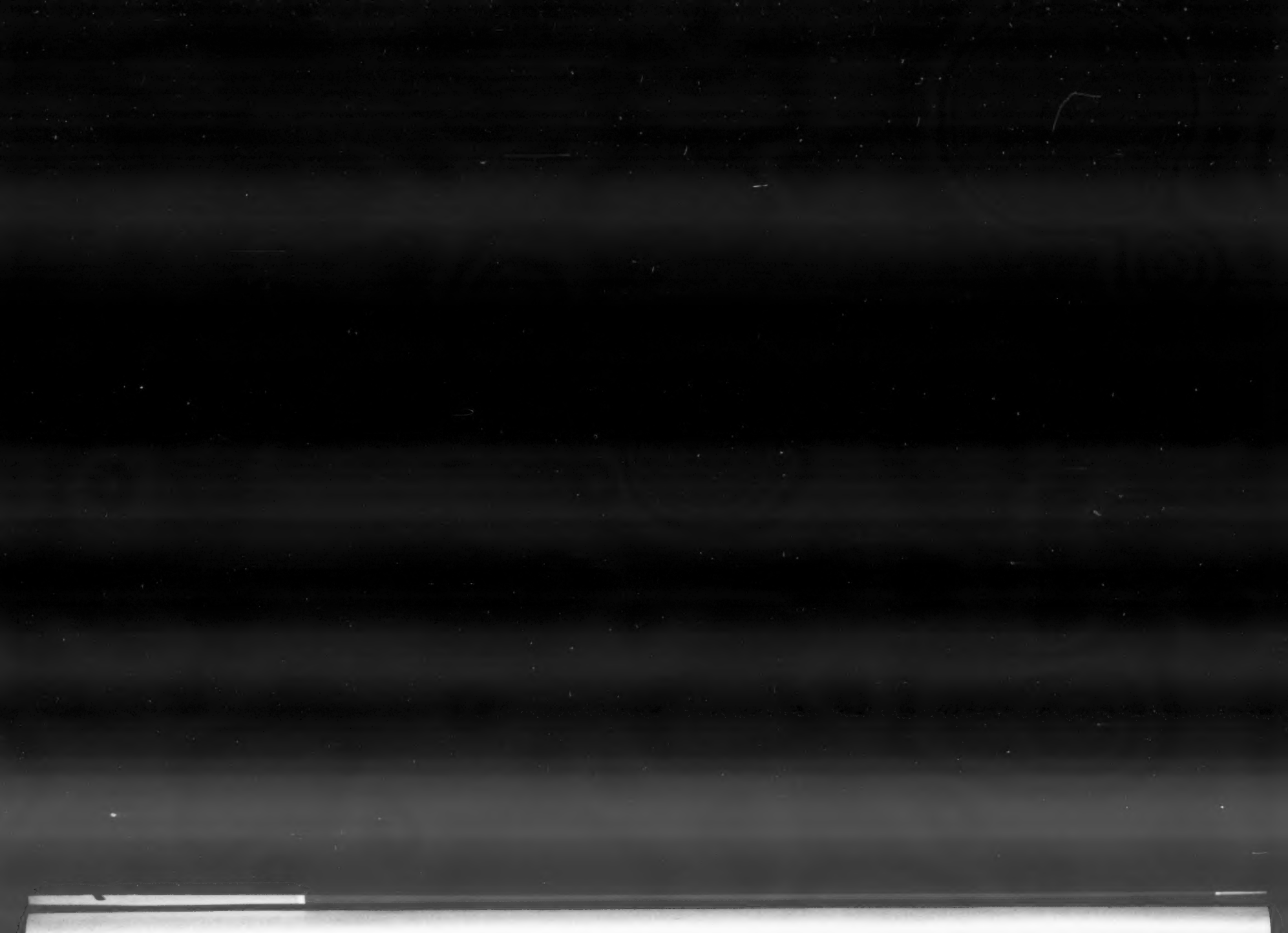
Announcement of a contract for the construction of a new, modern manufacturing plant to be built by Wheeling Machine Products Co. has been made by **President Ernest W. Krause.** The new plant, together with its office building and equipment, will cost in excess of a million dollars and construction has already been started. The site of the new unit will be a 12½-acre plot on Highway U. S. 40 near Wheeling, W. Va.

Joseph B. Terbell, affiliated with various divisions of American Brake Shoe Co. in sales and executive capacities since 1928, has been appointed executive vice president of Brake Shoe's American manganese steel division. In 1940 he was promoted from a district sales manager's position to a vice presidency with American Manganese Steel. Three years later he was named first vice president.

E. L. Oliver, president of Oliver United Filters, Inc., announces that the board of directors has elected **L. R. Boling** treasurer of the corporation. Boling has been controller for the past 5 years and will continue in that capacity. The board also elected as secretary of the corporation **Edwin L. Oliver, Jr.,** son of the president, who has been with the organization for 12 years. He will continue as assistant to the executive vice president, **P. A. Hoyt.**

Retirement of **William A. Edsall,** for many years vice president in charge of sales of Attapulgus Clay Co., is announced. He will be succeeded by **Robert H. Hubbell, Jr.** Announcement was also made that **William S. W. McCarter** has been named technical director of the company, succeeding Hubbell.

J. H. Adkison, recently returned from Navy service, has rejoined Dowell Incorporated as district manager in Philadelphia, Pa., replacing **S. C. Morian,** resigned. Prior to entering the service, Adkison was district sales manager for Dowell in Midland, Tex.

Capt. Vincent H. Godfrey, who recently completed a tour of service in the U. S. Navy, has returned to Page Steel and Wire Division of American Chain & Cable Co., Inc., as sales engineer, with headquarters at Monessen, Pa.

Maintenance Engineering Corp., Houston, Tex., pleasantly surprised 11 war veterans recently returned from military service to rejoin the organization. Each veteran received U. S. Government bonds ranging in amounts from $150 to $1,050, representing purchases made by the company for these employes each Christmas during the period of military service of these employes, who are shown above, with C. E. Naylor, president of Maintenance Engineering Corp. Left to right: SF 2/c Marion Comeaux, Lt. George Moore, MM 1/c Raymond Hubert, Corp. Huling Hubert, A/C Clyde Jackson, Sgt. Leon Lyle, Naylor, Lt. Raymond Ellis, Maj. A. J. Hooper, Lt. Tom Swope, Master Sgt. Raymond Talley, and Master Sgt. J. B. Fargerson. In addition to these bonds, presented at the annual Christmas party, Maintenance Engineering Corp. presented extra checks to each employe, ranging in amounts from $25 to $400.